metals review

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Convention Halls, Philadelphia, Pa.

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Metals Review

VOLUME XXVIII, 9 September, 1955

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Philadelphia Oct. 15-21

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NATIONAL METAL CONGRESS AND EXPOSITION

Philadelphia, Oct. 15 to 21

Monday, Oct. 17

TITANIUM

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Rate of Diffusion of Carbon in Alpha and Beta Titanium, by F. C. Wagner, E. J. Bucur and M. S. Steinberg, Horizons, Inc.

Hydrogen Contamination in Descaling and Acid Pickling of Titanium, by G. A. Lenning, C. M. Craighead and R. I. Jaffee, Battelle Memorial Institute.

Mechanical Properties of Ti-Cr-Mo Alloys as Affected by Grain Size and Grain Shape, by H. R. Ogden, F. C. Holden and R. I. Jaffee, Battelle Memorial Institute.

Investigation of the Heat Treatability of the 6% Aluminum-4% Vanadium-Titanium-Base Alloy, by R. G. Sherman and H. D. Kessler, Titanium Metals Corp. of America.

MECHANICAL PROPERTIES

9:30 a.m.—Franklin Room, Benjamin Franklin

Presiding Officers: J. F. Libsch, Hunter Engineering Co., and V. H. Patterson, Climax Molybdenum Co.

Notch Ductile High Strength Nodular Irons, by G. A. Sandoz, H. F. Bishop and W. S. Pellini, Metal Processing Branch Metallurgy Division, Naval Research Laboratory.

Fatigue and Anistropy in Copper, by M. L. Ebner and W. A. Backofen, Metals Processing Laboratory, Massachusetts Institute of Technology.

Influence of Vibration on the Solidification of an Aluminum Alloy, by R. S. Richards, Titanium Metals Corp. and W. Rostoker, Armour Research Foundation of Illinois Institute of Technology.

SEMINAR ON THEORY OF ALLOY PHASES

(All meetings to be held at the Benjamin Franklin Hotel)

Co-Ordinator: Paul A. Beck
University of Illinois

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9:30 a.m.

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Band Theory of Bonding in Metals, by J. C. Slater, Massachusetts Institute of Technology.

Density of States as Determined by Soft X-Ray Spectroscopy, by C. H. Shaw, Ohio State University.

2:00 p.m.

Intermediate Phases and Electronic Structure, by T. B. Massalski, University of Chicago.

Crystal Structure and Atomic Size, by F. Iaves, Polytechnic Institute, Zurich, Switzerland.

Bonding Forces in Alkali Metals, by H. Brooks, Cruft Laboratory, Harvard University.

8:00 p.m.

Electronic Structure of Metals and Alloys, by L. Pauling, California Institute of Technology.

Sunday, Oct. 16

9:30 a.m.

Intermediate Phases in Alloys of the Transition Elements, by P. Duwez. California Institute of Technology.

Ferromagnetism, Antiferromagnetism and Crystal Structure, by C. Zener. University of Chicago.

Atomic and Magnetic Ordering in Intermediate Phases. by J. S. Kasper. General Electric Co., Schenectady.

2:00 p.m.

Atomic Moments of Transition Elements in Solid Solution Alloys, by C. Shull, formerly Oak Ridge National Laboratory, now associated with Massachusetts Institute of Technology.

Solid Solutions and Ordering, by B. Averbach, Massachusetts Institute of Technology.

Alloy Phase Diagrams, by G. V. Raynor, Birmingham University, England.

CONFERENCE ON DUCTILE CHROMIUM METAL AND ITS HIGH ALLOYS

(Jointly Sponsored by Office of Ordnance Research, U. S. Army, and ASM)

WORLD WIDE RESEARCH ON DUCTILE CHROMIUM

10:30 a.m.—Betsy Ross Room, Benjamin Franklin

Chairman: J. W. Dawson, Director, Chemical Sciences Division, of Ordnance Research, U. S. Army.

Introductory Remarks, by P. N. Gillon, Commanding Officer, Office of Ordnance Research, U.S.A.

Research on Chromium in America, by W. J. Kroll, Consultant.

Research on Chromium in Australia, by Henry L. Wain, Department of Supply, Government of Australia.

Research on Chromium in Europe, by A. H. Sully, Fulmer Research Institute, England.

PHYSICAL METALLURGY OF HIGH-CHROMIUM ALLOYS

2:00 p.m.—Betsy Ross Room, Benjamin Franklin

Chairman: J. H. Holloman, Manager, Metallurgy and Ceramics Research Department, General Electric Research Laboratory.

Influence of Chromium Metal Purity on the Properties of Chromium Alloys, by Robert I. Jaffee, Battelle Memorial Institute.

Solubility of Nitrogen and Oxygen in Solid Chromium, by A. A. Burr, Rensselaer Polytechnic Institute.

Ternary System of Chromimum-Nickel Alloy Containing up to 5% Nitrogen, by N. J. Grant, Massachusetts Institute of Technology.

Oxidation of Chromium and Chromium Alloys, by W. Martin Fassel, Jr., University of Utah.

Kinetics of the Formation of the Sigma Phase in Chromium-Iron Alloys, by Pol Duwez and Howard Martens, California Institute of Technology.

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TITANIUM-ZIRCONIUM

2:00 p.m.—Crystal Ballroom, Benjamin Franklin

Presiding Officers: G. W. Birdsall, Reynolds Metals Co., and J. L. Wyatt, Horizons, Inc.

Nature and Decomposition Kinetics of Alpha Prime in Titanium-Vanadium Alloys, by F. R. Brotzen, Rice Institute, and E. L. Harmon and A. R. Troiano, Case Institute of Technology.

Metallography of Tempering of Alpha-Prime in Titanium Alloys, by R. F. Domagala and W. Rostoker, Armour Research Foundation of Illinois Institute of Technology.

Tensile Properties of Zirconium-Chromium Alloys—Particle Strengthening Effects, by J. H. Keeler, General Electric Co.

Progress in the Development of Creep-Resistant Zirconium Alloys, by Walston Chubb, Battelle Memorial Institute.

PANEL DISCUSSION ON VACUUM MELTED METALS

4:30 p.m.—Crystal Ballroom Benjamin Franklin

The discussion will start with presentation on current applications of vacuum melted metals, particularly antifriction bearings and jet engine components. Engineering properties and workability will be considered next, with discussions of statistical data on the ranges of properties obtained from a large number of consecutive heats. Other topics to be dealt with include comparisons of different ingot sizes, properties of bar stock versus forged components, induction compared with arc melting, control of process variables, trends in specifications for vacuum melted metals and in the melting equipment.

Chairman: W. E. Jones, Manager, Vacuum Melted Products Engineering, Carboloy Dept., General Electric Co.

Panel Members:

F. N. Darmara, Vice-President and Manager of Metals Div., Utica Drop Forge & Tool Corp.

S. G. Demirjian, Supervisor, Process Control, Small Aircraft Engine Dept., General Electric Co.

W. W. Dyrkacz, Associate Director of Research, Allegheny Ludlum Steel Corp.

G. A. Fritzlen, Technical Director, Haynes Stellite Co.

James H. Moore, General Manager, Vacuum Metals Corp.

James D. Nesbit, Director of Research and Development, Universal-Cyclops Steel Corp.

C. E. Norton, Chief Metallurgist, New Departure Div., General Motors Corp.

W. H. Sharp, Engineering Metallurgist, Pratt & Whitney Aircraft

R. G. Ulrech, Director, Engineering and Development, Consolidated Vacuum Corp.

8:00 p.m.—Crystal Ballroom, Benjamin Franklin

Continuation of panel discussion which opened at 4:30 p.m.

Tuesday, Oct. 18

CONFERENCE ON DUCTILE CHROMIUM METAL AND ITS HIGH ALLOYS

CHROMIUM METAL

9:00 a.m.—Betsy Ross Room, Benjamin Franklin

Chairman: A B. Kinzel, Vice-President (Research), Union Carbide & Carbon Corp.

Preparation and Properties of Iodide Chromium, by I. E. Campbell, Battelle Memorial Institute.

Electrowinning of Chromium from Trivalent Solutions, by M. C. Carosella and J. D. Mettler, Electro Metallurgical Co.

Melting Point of High-Purity Chromium, by LeRoy L. Wyman, National Bureau of Standards.

Mechanical Properties of Massive Chromium, by G. Asai and K. D. Deardorf, U. S. Bureau of Mines.

Effects of Impurities on the Ductility of Chromium, by W. H. Smith and A. U. Seybolt, General Electric Co.

Volume Change and Evolution of Gases on Heating Electrolytic Chromium, by Kenneth A. Moon and George A. Consolazio, Watertown Arsenal.

TEMPERING OF STEEL

9:30 a.m.—Crystal Ballroom, Benjamin Franklin

Presiding Officers: F. T. McGuire, Deere and Co., and P. Payson, Crucible Steel Co. of America.

Some Effects of Silicon on the Mechanical Properties of High Strength Steels, by C. H. Shih, A. L. Averbach and Morris Cohen, Massachusetts Institute of Technology.

Some Relationships Between Endurance Limit and Torsional Properties of Steel, by S. T. Ross, R. P. Sernka and W. E. Jominy, Chrysler Corp.

Influence of Molybdenum and Tungsten on Temper Embrittlement, by A. E. Powers, Materials & Processes Lab, General Electric Co.

Hardness of Tempered Martensite in Carbon and Low Alloy Steels, by R. A. Grange and R. W. Baughman, United States Steel Corp.

DEFORMATION

9:30 a.m.—Franklin Room, Benjamin Franklin

Presiding Officers: N. J. Grant, Massachusetts Institute of Technology, and W. D. Manly, Oak Ridge National Laboratory.

Deformation of Beryllium Single Crystals at 25 to 500°C., by H. T. Lee and R. M. Brick, School of Metallurgical Engineering, University of Pennsylvania.

Grain Boundary Creep in Aluminum Bicrystals, by F. N. Rhines, W. E. Bond and M. A. Kissel, Carnegie Institute of Technology.

Deformation and Fracture Mechanisms of Polycrystalline Magnesium at Low Temperatures, by F. E. Hauser, P. R. Landon and J. E. Dorn, University of California.

Influence of Cold Work on Strength of Steel at Elevated Temperatures, by Paul Shahinian, Metallurgy Division, Naval Research Laboratory.

CONFERENCE ON DUCTILE CHROMIUM METAL AND ITS HIGH ALLOYS

HIGH-CHROMIUM ALLOYS

2:00 p.m.—Betsy Ross Room, Benjamin Franklin

Ductile Chromium-Iron Alloys, by R. W. Fountain and J. L. Lamont, Electro Metallurgical Co.

Toughness and Mechanical Properties of Chromium-Iron Alloys, by H. Kato and E. T. Hayes, U. S. Bureau of Mines.

Creep Rupture Properties of Chromium-Nickel Alloys, by N. J. Grant, Massachusetts Institute of Technology.

A Forgeable Chromium-Iron Based Alloy, by D. P. Moon, H. A. Blank and A. M. Hall, Watertown Arsenal.

Metallography of Chromium and Chromium-Rich Alloys, by W. D. Forgeng and G. T. Motock, Union Carbide & Carbon Research Laboratories.

STEEL

2:00 p.m.—Crystal Ballroom, Benjamin Franklin

Presiding Officers: R. D. Chapman, Chrysler Corp., and A. R. Troiano, Case Institute of Technology.

Inhibition by Nitrogen of Graphitization in Steel, by G. V. Smith and B. W. Royle, Fundamental Research Laboratory, United States Steel Corp.

An Approach to the Study of the Effect of Rare-Earth Additions to Steel by Use of Radioactive Tracer Techniques, by C. S. DuMont, J. E. Gates, Battelle Memorial Institute, and C. N. Henderson, Mallinckrodt Chemical Works.

Optimum Boron Content for Hardenability, by J. C. Shyne, E. R. Morgan and D. N. Frey, Ford Motor Co.

On Banding in Steel, by C. Jatczak, D. J. Girardi and E. S. Rowland, Timken Roller Bearing Co.

INDUSTRIAL HEATING EQUIPMENT ASSOCIATION

(In Cooperation with ASM)

FURNACES, COMBUSTION EQUIPMENT AND INDUCTION HEATING

2.00 p.m.—Ballroom, Convention Hall

Vacuum Melting by Induction and Arc, by Frank Chesnut, Ajax Electrothermic Corp.

Batch-Type Strip Annealing Furnaces —Multiple and Single Stack, by Fred Olmstead, Lee Wilson Engineering Co.

Combustion Systems in Steel Mills, by Fred Bloom, Bloom Engineering Co.

EDUCATIONAL LECTURES ON EMBRITTLEMENT PHENOMENON

4:30 p.m.—Room 200, Convention Hall

Summary of Embrittement Phenomena and General Discussion of Their Effects, by B. R. Queneau, U. S. Steel Corp.

8:00 p.m.—Room 200, Convention Hall

Work Hardening and Precipitation Embrittlement, by B. R. Queneau, U. S. Steel Corp.

Wednesday, Oct. 19

A.S.M. ANNUAL MEETING

9:30 a.m.—Benjamin Franklin Hotel

CAMPBELL LECTURE

10:00 a.m.—Benjamin Franklin Hotel

Robert H. Aborn, Director of Research Laboratories, United States Steel Corp.

STEEL

2:00 p.m.—Crystal Ballroom, Benjamin Franklin

Presiding Officers: H. A. Avery, American Brake Shoe Co., and J. A. Berger, University of Pittsburgh

Some Effects of Metal Removal and Heat Treatment on the Surfaces of Hardened Steel, by Karl E. Beu, Goodyear Atomic Corp. and Donald P. Koistinen, Research Laboratories Division, General Motors Corp.

Effect of Temperature on Delayed Yielding of Mild Steel for Short Loading Duration, by Joseph M. Krafft, Mechanics Division, Naval Reserve Laboratory.

Effect of Tempering Temperature on Stress Corrosion Cracking and Hydrogen Embrittlement of Martensitic Stainless Steels, by Peter Lillys and A. E. Nehrenberg, Crucible Steel Co. of America.

Static Fatigue of High Strength Steel, by R. H. Raring and J. A. Rinebolt, Naval Research Lab.

MOLYBDENUM-VANADIUM-TANTALUM

2:00 p.m.—Betsy Ross Room, Benjamin Franklin

Presiding Officers: D. J. McPherson, Armour Research Foundation of Illinois Institute of Technology, and G. Timmons, Climax Molybdenum Co.

Initiation of Discontinuous Yielding in Ductile Molybdenum, by J. A. Hendrickson, D. S. Wood. and D. S. Clark, California Institute of Technology.

Properties of Vanadium Consoliated by Extrusion, by C. E. Lacy and C. J. Beck, General Electric Co., Knolls Atomic Power Laboratory.

Mechanical Properties of Vanadium-Base Alloys, by W. Rostoker and A. S. Yamamoto, Armour Research Foundation of Illinois Institute of Technology, and R. E. Riley, Rem-Cru Titanium Corp.

Rolling Textures in Tantalum in Relation to BCC Metals, by J. W. Pugh and W. R. Hibbard, Jr., General Electric Co.

INDUSTRIAL HEATING EQUIPMENT ASSOCIATION

MECHANIZED HEAT TREATING EQUIPMENT AND ITS APPLICATION

2:00 p.m.—Ballroom, Convention Hall

Mechanized Molten Baths, by Leon Rosseau, Ajax Electric Co.

Mechanized Batch-Type Furnaces, by Martin Neumeyer, Sunbeam Corp.

Mechanized Continuous-Type Furnaces, by George McCormick, Industrial Heating Equipment Co.

Metallurgical Aspects Associated With Induction Heating, by Harry Osborn, Tocco Division, Ohio Crankshaft Co.

EDUCATIONAL LECTURES ON EMBRITTLEMENT PHENOMENON

4:30 p.m.—Room 200, Convention Hall

Embrittlement by Gases, by B. R. Queneau, U. S. Steel Corp.

8.00 p.m.—Room 200, Convention Hall

Temper Brittleness and Sigma Phase, by B. R. Queneau, U. S. Steel Corp.

Thursday, Oct. 20

STAINLESS STEELS

9:00 a.m.—Crystal Ballroom, Benjamin Franklin

Presiding Officers: D. J. Carney, U. S. Steel Corp., and G. A. Fritzlen, Haynes Stellite Co.

Influence of Alloying Elements on the Impact Transition Behavior of 1.2% Cr Steels Aged at 900°F., by E. J. Whittenberger and E. R. Rosenow, United States Steel Corp.

Creep Rupture Properties of Cold Worked Type-347 Stainless Steel, by N. J. Grant, A. G. Bucklin and Warren Rowland, Massachusetts Institute of Technology.

Notch Ductility of Type-410 (12% Cr) Stainless Steel, by F. A. Brandt, H. F. Bishop and W. S. Pellini, Metal Processing Branch Metallurgy Division, Naval Research Lab.

Influence of Strain Rate and Temperature on the Ductility of Austenitic Stainless Steel, by G. W. Form and W. M. Baldwin, Jr., Case Institute of Technology.

POWDER METALLURGY IN ATOMIC ENERGY

(Jointly sponsored by Atomic Energy Commission and A.S.M.)

9:30 a.m.—Betsy Ross Room, Benjamin Franklin

General Chairman: Henry H. Hausner, Manager of Atomic Energy Engineering, Sylvania Electric Products, Inc.

General Metallurgical Problems in the Design in Nuclear Power Reactors, by Vincent P. Calkins, Aircraft Nuclear Propulsion Project, General Electric Co.

Preparation of Metal Powders for Nuclear Reactor Purposes, by Premo Chiotti and Harley A. Wilhelm, Institute for Atomic Research, Iowa State College.

Latest Developments in the Theory of Sintering, by Leslie L. Seigle, and A. Pranatis, Fundamental Metallurgy Section, Sylvania Electric Products, Inc.

Powder Metallurgy of Beryllium and Zirconium, by Harold Hirsch, Knolls Atomic Power Laboratory, General Electric Co.

STAINLESS STEELS

2:00 p.m.—Betsy Ross Room, Benjamin Franklin

Presiding Officers: W. O. Binder, Electro Metallurgical Co., and G. V. Smith, Cornell University.

High-Nitrogen Austenitic Cr-Mn Steels, by V. F. Zackay, Scientific Laboratory, Ford Motor Co., J. L. Carlson, Hoskins Manufacturing Co., and P. L. Jackson, Misco Precision Casting Co.

Effect of Composition and Structure on the Creep Rupture Properties of 18-8 Stainless Steels, by F. C. Monkman, P. E. Price and N. J. Grant, Massachusetts Institute of Technology.

Austenitic Fe-Cr-C-N Stainless Steels, by G. F. Tisinai, J. K. Stanley and C. H. Samans, Standard Oil Co. of Indiana.

Effects of Chemical Composition and Heat Treatment Upon the Microstructure and Corrosion Resistance of AISI Types 309 and 310, by D. J. Carney and E. R. Rosenow, United States Steel Corp.

POWDER METALLURGY IN ATOMIC ENERGY

2:00 p.m.—Betsy Ross Room, Benjamin Franklin

Alloy Formation by Powder Metallurgy, by Henry A. Saller and Frank A. Rough, Battelle Memorial Institute.

New Methods of Powder Metallurgy for Nuclear Reactor Purposes, by William D. Manly and John H. Cooks, Oak Ridge National Laboratory.

Safe Handling of Pyrophoric and Radioactive Materials, by L. R. Kelman, A. B. Shuck and R. C. Goertz, Argonne National Laboratorv.

Summary of Recently Disclosed Information on Thorium, Uranium and Special Metals for Nuclear Reactors, by Henry H. Hausner, Sylvania Electric Products, Inc.

Metal Show News

A.S.M. Gold Medal To Be Presented to Boegehold

Alfred L. Boegehold, head of the metallurgy department, Research Laboratories Division, General Motors Corp., is the 1955 recipient of the American Society for Metals Gold Medal.

The A.S.M. Gold Medal was established in 1943 to recognize outstanding metallurgical knowledge and special ability in the diagnosis and solution of diversified metallurgical problems.

Employed first at Remington Arms and Munitions Co. in the manufacture of army rifle components, Mr. Boegehold has long been one of the country's leading authorities on metallurgy and metallurgical research.

He has been head of the metallurgy department at G. M.'s Research Laboratories Division since 1925. Solutions of the problems which have paralleled the advances in automotive design and material have placed the 1955 Gold Medalist among the outstanding engineers of this era.

Alfred Boegehold is a native of New York. He was educated in the public schools of Mount Vernon and is a graduate of Cornell University. In addition to his long membership in the American Society for Metals, Mr. Boegehold is a past national trustee and past national president of the Society, and a past chairman of the Detroit Chapter. In 1938 he was the Campbell Memorial Lecturer.

Chapter Secretaries To Be Guests at Metal Show

N. J. Finsterwalder, who has been secretary of the Rochester Chapter since 1946, and Ernest G. Guenther, who has been secretary of the Milwaukee Chapter since 1936, will be guests of the American Society for Metals during the National Metal Congress and Exposition in Philadelphia, following the practice of the Society to honor men who have served their chapters in the capacity of secretary for 10 and 20 years.

Mr. Finsterwalder is chief metallurgist for Taylor Instrument Cos., Rochester, and Mr. Guenther is chief metallurgist for Wisconsin Motor Corp., Milwaukee.

Aborn Selected To Deliver Campbell Memorial Lecture

The Board of Trustees of the American Society for Metals has selected Robert H. Aborn, director of research laboratories, United States Steel Corp., to give the Edward deMille Campbell Memorial Lecture on Wednesday, Oct. 19, 1955, immediately following the Annual Meeting of the Society during the National Metal Congress.

Robert H. Aborn received a B.A. degree from Grinnell College in 1918, and two years later a B.S. degree from Massachusetts Institute of Technology. M.I.T. conferred a Ph.D. degree upon Aborn in 1925.

Dr. Aborn was associated with the Chemical Warfare Service, U. S. Army, at the close of the first World War. From 1920 to 1921 he was employed in the blast furnace department of Bethlehem Steel Co. He also spent two years in X-ray research at the Watertown Arsenal. From 1925 to 1928, Dr. Aborn was engaged in X-ray research at Massachusetts Institute of Technology, transferring to Harvard University in 1928 as instructor of metallurgy, where he remained for two years.

In 1930, Dr. Aborn joined United States Steel Corp. as assistant metallurgist in the research laboratory. In 1954 was named director of research laboratories, succeeding James B. Austin, past president A.S.M., who was named assistant vice-president, fundamental research.

Dr. Merica Joins A.S.M.'s Honorary Member Roster

Paul D. Merica, former president and present director of International Nickel Co. and International Nickel Co. of Canada, and director for American Metal Co., Babcock & Wilcox Co. and Whitehead Metal Products Co., has been made an honorary member of the American Society for Metals.

Dr. Merica, the 22nd person to be so honored, joins a roster of distinguished scientists and engineers, both past and present.

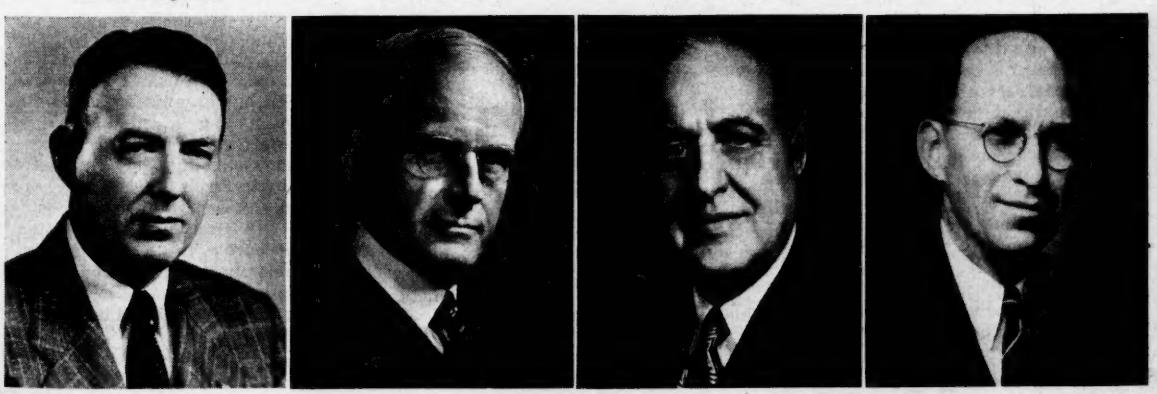
Among those with honorary membership in the Society are such great names as Charles F. Brush, Edward deMille Campbell, Henry le Chatelier, Thomas A. Edison, Albert H. Gary, Elwood Haynes, Sir Robert Hadfield, Kotaro Honda, Henry Marion Howe, John Alexander Mathews, Albert Sauveur and Charles M. Schwab.

Outstanding men of the present who are among the honorary members of the Society include Benjamin F. Fairless, Zay Jeffries and Charles F. Kettering. Honorary membership is also held by Axel Hultgrin, Willis R. Whitney, Cecil H. Desch, Albert E. White, Albert Portevin and Bradley Stoughton.

The newest name on the Society's

(*continued on p. 8*)

A. L. Boegehold *P. D. Merica* *R. W. Straus* *R. H. Aborn*



honorary membership list is one of the country's top authorities on the development of light metals. It was in this field that Dr. Merica made outstanding contributions while a member of the staff of the U. S. National Bureau of Standards. He is also generally credited with the precipitation theory of hardening.

Dr. Merica is a native of Indiana and received his engineering education at DePauw University and the University of Wisconsin. He holds doctor's degrees from three universities, including a doctorate in physics from the University of Berlin.

Dr. Merica joined International Nickel Co. shortly after World War I and served as vice-president and executive vice-president before becoming president. He was chairman of the New York Chapter A.S.M. in 1922 and received the A.S.M. Gold Medal in 1951 in recognition of the work he did in the promotion of metallurgical research.

A.S.M. Sauveur Award to Go to William J. Kroll

William Justin Kroll, a native of Luxembourg, and a U. S. citizen since 1950, is the 1955 winner of the Albert Sauveur Achievement Award, presented by the American Society for Metals.

The award was established by A.S.M. in 1934 in honor of Dr. Albert Sauveur, late Harvard University professor and widely known as "Dean of American Metallurgists". The purpose of the award is to recognize pioneering achievements which have stimulated organized research along similar lines to such an extent that marked basic advances have been made in metallurgical knowledge.

Dr. Kroll has many significant achievements to his credit. A particular achievement—that of his pioneering work on malleable titanium—is the basis for his selection for the 1955 Sauveur Award.

Dr. Kroll's first successful method for making satisfactory titanium in commercial quantities is the result of his initial research, begun in 1937. The value of Dr. Kroll's work was recognized by the U. S. Bureau of Mines and has been widely accepted by industrial companies.

The citation which accompanies the Sauveur Award will state that regardless of the outcome of subsequent studies, there is little question that the ultimate position of titanium as a commercial metal will be due in great measure to the pioneering activities of Dr. Kroll.

Visiting Lecturer to Talk At A.S.M. Seminar on Theory of Alloy Phases

The American Society for Metals is bringing to America the eminent professor, Geoffrey Raynor, head of the department of physical metallurgy, University of Birmingham, England.

Dr. Raynor was invited to fill this Visiting Lectureship assignment with the understanding that he would be able to visit some of our leading universities, as well as government research centers and industrial development laboratories.

Schedules for Dr. Raynor's individual lectures are in the formative stage and will be announced in detail in the next *Metals Review*.

Dr. Raynor will arrive here on Sept. 24, and after a two-week lecture tour to as many as five important schools, he will join the 37th National Metal Congress and Exposition in Philadelphia, where he will take part in the annual A.S.M. Seminar on the "Theory of Alloy Phases". Dr. Raynor's participation will be concerned with alloy phase diagrams.

Following Dr. Raynor's stay in Philadelphia during the 1955 Metal Congress, he will visit the Government's research agencies in Washington as well as industrial development centers, such as Bell Telephone Laboratories and others.

The British scientist will return to England in November.

Metallographic Exhibit Scheduled for Metal Show

The 10th Metallographic Exhibit of the American Society for Metals will be held at the National Metal Congress and Exposition in Philadelphia from Oct. 17 to 21.

Winning entries in the 9th annual exhibit, held in Chicago last year, were recently returned to A.S.M. headquarters in Cleveland after traveling over 10,000 miles on a tour to 17 A.S.M. chapters.

Twelve classifications of micrographs are designated for the 1955 contest. Subjects include carbon and alloy steels, stainless steels and heat resisting alloys, cast and wrought iron, aluminum, magnesium, beryllium, titanium and their alloys, copper, nickel, zinc, lead and their alloys, metals and alloys not otherwise classified, transitions or changes during processing, welds and other joining methods, surface phenomena, results by unconventional techniques (not electron micrographs), slags, inclusions, refractories, and cermets, and micrographs in color.

A grand prize of $100 cash will be presented for the best entry in the show. Blue ribbons will be given to the best entry in each of the 12 classifications, with honorable mentions to others.

Prize-winning entries will again be included in the A.S.M. traveling exhibit, starting out early in 1956.

AEC Chairman Strauss To Speak at A.S.M. Banquet

Lewis L. Strauss, chairman of the Atomic Energy Commission, will be guest speaker at the A.S.M. Annual Banquet, to be held in Philadelphia during the National Metal Congress and Exposition. Although the subject of his talk has not been released, Mr. Strauss will probably discuss the status and future of atomic energy in relation to its peace-time uses and to industrial progress.

Mr. Strauss served as secretary to Herbert Hoover in relief operations during the U. S. Food Administration Activities from 1917 to 1919. He returned to the banking firm of Kuhn, Loeb & Co. in 1919 and became a partner in 1929. He has been in the Naval Reserve for 27 years, serving actively from 1941 to 1946, and attaining the rank of Rear Admiral. In 1946, Mr. Strauss was appointed a member of the first Atomic Energy Commission, a post he resigned in 1950. In 1953, he was nominated by President Eisenhower as chairman of the A.E.C.

Professor From Kansas to Receive Teaching Award

Kenneth E. Rose, professor and chairman of the department of metallurgical engineering, University of Kansas, will receive the A.S.M. $2000 Metallurgy Teaching Award for 1955 at the Annual Banquet of the Society. This is the fourth consecutive year in which the cash award has been given to a teacher who, in the judgment of the Awards Committee, turned in the best all-around performance in the metallurgy curriculum.

Professor Rose is a native of Kansas. He received a B. S. degree in metallurgical engineering from Colorado School of Mines, and a M. S. degree in engineering from Cornell University. He has organized and taught extension courses in metallurgy in the Kansas City area by the university of Kansas, both at undergraduate and graduate levels.

Professor Rose, who is past chairman of the Kansas City Chapter, has been active in Society affairs, particularly in the promotion of interest among high school and junior college students. He conducted the A.S.M. summer courses in Metals Technology for high-school teachers in June 1955.

METAL SHOW NEWS (continued)

Straus to be Given A.S.M. Research Medal

The 1955 A.S.M. Medal for the Advancement of Research will be presented to Roger W. Straus, chairman of the board, American Smelting and Refining Co., at the Society's Annual Banquet, to be held during the National Metal Congress and Exposition.

The award, which is given annually to an executive in an industrial organization, the principal activity of which is the production or fabrication of metals, who, over a period of years, has consistently sponsored metallurgical research or development, and by whose foresight and influence in making available financial support, has helped substantially to advance the arts and science related to metals.

Mr. Straus is one of the country's leaders in the field of metallurgical research. His company has pioneered in many fields of investigation which have led to substantial gains in the quality and usefulness of products made by metals.

Mr. Straus is a native of New York and received his early education in New York City. He graduated from Princeton and holds honorary degrees from Bucknell and New York University.

Howe Medal to Go to Nehrenberg and Lillys

The 1955 Henry Marion Howe Medal will be presented to A. E. Nehrenberg, supervisor, research laboratory, and Peter Lillys, research metallurgist, Crucible Steel Co. of America, for their paper, "High-Temperature Transformations in Ferritic Stainless Steels Containing 17 to 25% Chromium".

The award, established in 1922 in honor of Henry Marion Howe, the Dean of American Metallurgists, is presented annually to the author or authors of the paper judged of highest merit presented before the A.S.M. and published during any one year in the Transactions of the Society. The paper, for which the 1955 award will be presented during the National Metal Congress and Exposition in Philadelphia in October, appeared in Vol. 46 of the A.S.M. Transactions, 1954.

Translation Monthly To be Published

The Translation Pool set up by the Special Libraries Association at the John Crerar Library has grown so rapidly that a new publication, *Translation Monthly,* will be published by SLA if 310 orders are received before Oct. 1.

The new publications will list the translations which are added to the Pool each month. There are now 4300 translations in the Pool from all languages except Russian, and copies are available at the regular photocopying prices from the John Crerar Library.

Checks should be made payable to *Translation Monthly.* Subscriptions ($5.00 per year) are accepted only for the calendar year beginning January 1955. Orders and checks should be sent to:

SLA Translation Pool
The John Crerar Library
86 East Randolph St.
Chicago 1, Ill.

Shepherd Receives Honorary Degree

Lafayette College Conferred an Honorary Degree of Doctor of Science on Benjamin Franklin Shepherd, Chief Metallurgist, Ingersoll-Rand Co., for His Work During World War II. He is shown at right being congratulated by Pennsylvania's Governor Robert B. Meyner During the Ceremony

Benjamin Franklin Shepherd, chief metallurgist, Ingersoll-Rand Co., past president A.S.M., and recipient of the Bradley Stoughton Award for outstanding contributions to metallurgy, recipient of the A.S.M. Sauveur Medal recognizing achievements stimulating wider and basic scientific advances, and pioneer in work on the hardenability of high carbon steel, has recently been granted an honorary degree of Doctor of Science by Lafayette College, Easton, Pa.

Lafayette President Hutchison's citation, which is reproduced here, adequately covers Dr. Shepherd's achievements.

—"The text of this academic greeting I would take from the classical book of Cardinal Newman on the University, in which he says that the college or university is the best method of education for the ordinary mind. We take honest delight in the world of courses, credits, diplomas and degrees in recognizing those extraordinary minds who without benefit or handicap of the conventional academic processes have educated themselves and attained scholarly and scientific distinctions. In stating this thesis I have told your story. Your remarkable scientific education and spectacular achievements since your graduation from high school, first employment as a mail clerk at Ingersoll-Rand, your study of metallurgy by reading, by practice, by experiment, and by eager fellowship with skilled metallurgists, your revolutionary achievements in the hardening of metals and in the modification of the lost wax precision casting process, your many inventions, your recognized leadership in the profession, your contributions to the nation's defense, your writings and publications in the field of metallurgy, all these add up to higher education without benefit of college or university. Lafayette College welcomes this opportunity to add now the certification and approval of formal education".

View of the Speakers' Table and a Part of the Group Which Attended the Luncheon Given by Centre National de Recherches Metallurgiques at "Le Mosan", in Liege, Belgium, on June 13, 1955

Joint Metallurgical Societies Meeting... Europe, 1955

Members of the American Society for Metals and the American Institute of Mining and Metallurgical Engineers accepted invitations from the British Iron and Steel Institute, the Institute of Metals, Verein Deutscher Eisenhuttenleute, Centre National de Recherches Métallurgiques and Société Française de Métallurgie, to join them in a series of technical meetings and plant tours in England and on the Continent.

This Joint Metallurgical Societies Meeting was organized in an effort to establish personal contact between North American and European metallurgists, to provide opportunities for scientific and technical discussion, and to enable North American visitors to see something of the metallurgical industries of Europe, as well as to foster better understanding and cooperation among all concerned.

The London technical sessions took place on June 2 and 3. However, because of the British rail strike, many of the pre-arranged plant visits had to be cancelled and others arranged.

A.S.M. President George A. Roberts and National Secretary W. H. Eisenman were present at the opening plenary session of the meeting in England, held on June 1. During this meeting, A.S.M. Past-President John Chipman, head of the department of metallurgy, Massachusetts Institute of Technology, was presented the 1955 Bessemer Gold Medal of the Iron and Steel Institute by Hon. R. G. Lyttelton, past-president of the Institute. Sir Lawrence Bragg, Fullerian professor of chemistry and director of the Davy Faraday Laboratory of the Royal Institution, presented the inaugural lecture on "X-Ray Analysis and Structure of Metals".

Over 180 delegates from the United States and about 150 from the Continent, and nearly 300 British delegates registered for the British sessions.

The delegates met next in Dusseldorf, on June 8, for the opening session in Germany. Dr. H. R. Schenck, president of Verein Deutscher Eisenhuttenleute, bestowed an honorary non-resident membership of the V.D.E. on Dr. Roberts, and Dr. P. Brenner, president of the Deutsche Gesellschaft fur Metallkunde, bestowed similar honors on W. H. Eisenman, in recognition of his work in international cooperation among scientists in the field of metals, having particular reference to his organization and operation of the first World Metallurgical Congress in 1951.

A feature of the technical sessions in Germany was the use of high-frequency radios for simultaneous translations into English and French of the German speakers, and *vice versa.* The headphones and receiver (which incorporated germanium transistors) weighed little more than an ounce. As the receiver required no plugging in, the wearer could walk about freely.

Technical sessions commenced on June 9, and covered most aspects of practical metallurgy, including blast furnace and coke-oven practice, steelmaking and con-

General View of the Guildhall, Site of the Banquet Held in London for the World-Wide Delegates

Speakers at the Guildhall Banquet Given in London Included, From Left: the American Ambassador, Winthrop W. Aldrich; National President A.S.M., George A. Roberts; and Sir Seymour Howard, Lord Mayor of London. (Photographs courtesy British Iron and Steel Federation)

tinuous casting, rolling mill problems, physical metallurgy and nonferrous metal production. Plant visits were made to several industries in various sections of Germany. A reception, given to delegates by the Mayor of Dusseldorf at Benrath Castle, and a steamer trip down the Rhine, were included in the German itinerary.

On June 13, delegates went on to Leige, Belgium, where they were received by M. F. Perot, president of the Centre National de Recherches Métallurgiques. Four splendid technical meetings and works visits were arranged for the day, and the group continued on to Paris in the evening.

On the morning of June 14, delegates gathered at the Sorbonne, where welcoming addresses were made by M. R. de Vitry, president of the Société Française de Métallurgie, and M. J. Sarrailh, rector of the University of Paris. Technical sessions and visits began in the afternoon, and the seven possible visits covered a wide range of subjects, from motor car manufacture to research in metallurgical chemistry. A reception was given for the delegates by the French Government at the Louvre the same evening. Technical sessions and further tours were arranged for subsequent days, and time was also left open for purely nontechnical touring.

The closing function of the Joint Metallurgical Societies Meeting was an official reception and dinner in the Orangerie at the Palace of Versailles.

A. S. M. President Roberts, in addition to honors

Delegates Who Toured the Orangerie at Versailles Are Shown at the Entrance of the Library. At the Museum were, from left: S. C. Spalding former A. S. M. trustee; Mrs. Spalding; Frederick Franz, West Haven, Conn.; Evelyn Gardner, secretary to W. H. Eisenman; E. L. Dupuy, secretary, Societe Francaise de Metallurgie; Hermann Schenck, V.D.E.; L. P. Ledoux, Teaneck, N. J.; and Francis B. Foley, A.S.M. past president. At the reception at the Louvre are, from left: Mrs. Walter Crafts; Mrs. N. M. Demarest; Walter Crafts, A.S.M. trustee; A. O. Schaefer, A.S.M. vice-president; Mrs. W. A. Pennington; and Mr. Pennington, A.S.M. treasurer. Below, at the Plenary Session in Dusseldorf, using light-weight headsets for instantaneous translation, are, from left: Hermann Schenck, president, V.D.E.; E. Kirkendall, secretary, A.I.M.E.; Mrs. G. A. Roberts; Dr. Roberts, president, A.S.M.; W. H. Eisenman; and H. Biers, Union Carbide & Carbon Corp.

mentioned above, received Honorary Memberships in the Institute of Metals, England, Société Française de Métallurgie, France, and the Association des Ingenieures Sortis de l'École de Liege, Belguim. Honorary Memberships and medals were bestowed on Mr. Eisenman by the Société Française de Métallurgie and the Association des Ingenieures Sortis de l'École de Liege. The Iron and Steel Institute of Great Britain conferred honorary membership on Mr. Eisenman at a meeting at Church House in London on May 31. At the time this honor was bestowed, there were only six living honorary members and only one other American. Since the foundation of the Institute in 1869, only 49 individuals have been awarded this distinction.

To Set Up Speech Clinic During Metal Congress

A new service for speakers who are to present technical papers will be provided at the National Metal Congress to be held in Philadelphia from Oct. 15-21, 1955.

Professor Kingsley W. Given of the department of speech at Kansas State College, who was executive assistant for the First World Metallurgical Congress in 1951, and who has been acting as consultant to the Chemical and Metallurgical Division, General Electric Co., for the past three years, will be available to assist speakers at A.S.M. technical sessions during the Congress. His services will be furnished by the American Society for Metals without charge and entirely on a voluntary basis.

As Mr. Given has pointed out, "The way the paper looks to the silent reader has no bearing at all on the way it sounds when read aloud." Therefore, each individual speaker needs personal consultation. "Doing does it", says Mr. Given. "No written text will cover all of the individual's problems".

All speakers interested in improving on the quality of their delivery are invited to contact Mr. Given for private consultation any time during the week of the National Metal Congress.

New Jersey Presents Annual Wyzalek Awards

The New Jersey Chapter Presented Its Annual Wyzalek Awards to Students From Eight Vocational and Technical High Schools Throughout the State. The awards are a memorial to the late John F. Wyzalek, past chairman of the Chapter, and are given for outstanding papers on metal characteristics, uses or treatments. Shown with the award winners are Hubert N. Alyea, guest speaker, and James A. Kearney, Chapter chairman, front center. M. F. W. Heberlein, who presented the awards, is not in the picture

IMPORTANT MEETINGS

for October

Oct. 3-5—National Electronics Conference and Exhibition. Eleventh Annual Meeting. Hotel Sherman, Chicago, Ill. (Executive Secretary, N.E.C., 84 East Randolph St., Chicago 1, Ill.)

Oct. 3-7—American Institute of Electrical Engineers. Fall General Meeting, Morrison Hotel, Chicago. (H. H. Henline, Secretary, A.I.E.E., 33 West 39 St., New York 18, N. Y.)

Oct. 6-8—Optical Society of America. 40th Annual Meeting, Hotel William Penn, Pittsburgh. (Arthur C. Hardy, Secretary, O.S.A., Massachusetts Institute of Technology, Cambridge 39, Mass.)

Oct. 9-13—Electrochemical Society, Inc. General Meeting, Hotel William Penn, Pittsburgh. (H. B. Linford, Secretary, E.S., 216 W. 102 St., New York 25, N. Y.)

Oct. 18-21—National Association of Corrosion Engineers. South Central Region Meeting, Hilton-Shamrock Hotel, Houston, Tex. (A. B. Campbell, Executive Secretary, N.A.C.E., 1061 M & M Bldg., Houston 2, Tex.)

Oct. 21—American Iron and Steel Institute. Regional Meeting, Hotel Mark Hopkins, San Francisco. (George S. Rose, Secretary, A.I.S.I., 350 Fifth Ave., New York 1, N. Y.)

Oct. 24-26—American Standards Association. Sixth National Conference on Standards, Sheraton-Park Hotel, Washington, D. C. (G. F. Hussey, Jr., Managing Direction, A.S.A., 70 East 45 St., New York 17, N. Y.)

Tells How Design Benefits If Process Controls Are Applied

Speaker: Ralph E. VanDeventer

Alloy Engineering & Casting Co.

At a meeting of the **Peoria Chapter**, Ralph E. VanDeventer, vice president, materials and process, Alloy Engineering & Casting Co., discussed "Design Benefits From Application of Process Controls".

Design advances are often hampered by inadequate understanding of the effects which metal producing and forming processes may have on the properties of components. Properties may be drastically altered by process factors substantially ignored by conventional handbook specifications and test methods.

Many illustrations showing the affect of residual stresses, directional effects, heat treating variables, and other items on the serviceability of parts were given.

Mr. Van Deventer closed by making special mention of process variables in the production of wrought and cast metals, with reference to research and development work on basic casting design and processes under sponsorship of the U. S. Air Force and Navy Bureau of Aeronautics. — **Reported by John G. Frantzreb for Peoria.**

St. Louis Chapter Holds Annual Picnic

Julius Turk (Right), Chairman of the St. Louis Chapter, Is Shown as He Receives an Attendance Prize From Karl Kaveler at the Annual Picnic of the Chapter. A heavy rainfall did not dampen the spirits of the 354 members and guests who attended the affair. (Reported by R. D. Leslie)

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Roughing Mill—An American-built two-high reversing roughing mill is turning out standard structural steel shapes in an Austrian mill. The mill, built by Lewis Machinery Div. of Blaw-Knox, is part of a complete structural mill erected for Oesterreichische-Alpine - Montangesellshaft, A. G., in Donawitz, Austria.

Extrusion Presses—Two 8000-ton extrusion presses have been installed at the heavy press plant to be operated by Kaiser Aluminum & Chemical Corp. for the U. S. Air Force at Halethorpe, Md. They are expected to be in operation some time this month.

Man-Made Moonlight—The Air Force reports that a few pounds of sodium will be raised by rocket to an altitude of 60 miles and released as a vapor over the New Mexico desert next month. If it glows, it will confirm a scientific belief that a layer of natural sodium exists at that altitude.

Air Pollution Research — Congress has authorized $25-million for air pollution research in the next five years. In 1956, legislators may attack steam pollution, with other millions for research, and with tougher laws and enforcement. A bill to this effect didn't miss by much at the last session.

Car Door Latches—Safer door latches will be standard equipment on Studebaker's 1956 models. The locks are designed to interlock with the frame, and will keep the doors closed in a collision.

Porter Buys—Electric Service Engineering Co., Joliet, Ill., has been bought by H. K. Porter Co., Inc. The company specializes in design and manufacture of complex electrical and electronic devices used in heavy industry and will be known as the Eseco Div., H. K. Porter Co., Inc.

Modern Plant — Mitchell-Bradford Chemical Co., manufacturers of Black Magic blackening processes for ferrous and nonferrous metals, metal cleaners, rust preventatives, plating specialties and a complete line of heat treating salts, has completed a modern plant to accommodate increased production and larger office and research facilities, in Milford, Conn.

Industrial Reactor—AMF Atomics, Inc., subsidiary of American Machine & Foundry Co., has announced that seven other major companies are participating in a project to build and operate the first nuclear reactor to be owned and operated by private industry. Participants are American Tobacco Co., Continental Can Co., Corning Glass Works, International Nickel Co., Chas. Pfizer & Co., Socony Mobil Oil Co. and U. S. Rubber Co.

Mixer-Cleaner — Development of an ultrasonic mixer-cleaner designed to perform difficult jobs on a production or laboratory basis has been announced by Alcar Instruments, Inc. The Alcar Mixer-Cleaner is useful for blind-hole cleaning, degreasing, mixing of previously immiscible liquids and removal of radioactive particles.

Corrosion Bibliography—NACE has published the fourth in a series of bibliographies on corrosion, a compilation of 4454 abstracts from some 500 periodicals and books by over 30 abstracting agencies.

Brochure—American Wheelabrator & Equipment Corp., which has announced a change in its corporate name to Wheelabrator Corp., is publishing a quarterly brochure devoted to precision cleaning and finishing. It deals with the wet abrasive blast cleaning process. Write to the company to be put on mailing list.

Plant Merger—Vanadium-Alloys Steel Co. has announced plans to merge with the Pittsburgh Tool Steel Wire Co., a plan which will enable each of the non-competitive companies to provide its customers with better service.

Spectroscopy Meeting — The Sixth International Colloquium on Spectroscopy will be held from May 14-19, 1956, at Amsterdam, Holland. Applications or queries from those wishing to submit papers may be sent to: Laboratorium voor Analytische Chemie, 125 Nieuwe Achtergracht, Amsterdam-C4, Holland.

European School — Minneapolis-Honeywell Regulator Co. plans to establish a technical training school in England to groom engineers and other technical personnel in the use of automatic control equipment used broadly in the U. S.

Pipe Fittings—Tube Turn Plastics, Inc. has announced a complete line of solvent welding pipe fittings and flanges of injection molded unplasticized polyvinyl chloride, the first to be produced commercially by the injection molding process.

Electroplating Course—A course in basic practical electroplating will be sponsored by the American Electroplaters' Society during the Fall. The course will consist of 11 weekly sessions, meeting for 2 hr. each on successive Tuesdays, beginning Sept. 27. Meetings will be held at various industrial plants and labs in the Newark, N. J., area.

Power Plant Course—Stevens Institute of Technology will offer a graduate course on "Introduction to Nuclear Power Plant Engineering". Sessions will be held on Friday evenings, starting Sept. 23.

Aluminum Plant—The $65-million primary aluminum plant of Anaconda Aluminum Co. was formally opened in Columbia Falls, Mont., recently. The company expects to reach planned capacity rate of 120-million lb. annually by 1956.

Flat-Type Welding Ring—A flat-type welding ring with ⅛-in. diam. spacer pins, developed to improve the submerged arc welding of pipe and fittings and to be suitable for many manual welding applications, has been announced by Tube Turns.

To Build—Square D Co. will begin construction immediately on a plant in Royal Oak, Mich., and has begun production at two recently-completed units in Cedar Rapids, Iowa, and Secaucus, N. J. The combined new facilities will represent ¼ million sq. ft. of manufacturing floor space added in 1955.

Increased Production—Pearlitic malleable iron casting production in 1955 will approach 170,000 tons, approximately double 1954, according to a survey made by the Malleable Founders' Society.

Portable Cutting Machine—National Cylinder Gas Co. has announced a portable flame cutting machine which weighs under 30 lb., about 20 lb. lighter than previous models.

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

85-A. Replacement Analysis by Capitalized Costs. Frederic C. Jelen. *Chemical Engineering,* v. 62, Aug. 1955, p. 181-188.

Economics of replacement of equipments; methods of cost analysis. Graphs, table. 5 ref. (A4)

86-A. Recent Advances in Steel Technology and Market Development. *Engineers' Digest,* v. 16, June 1955, p. 267-270.

A report from the commercial and essentially lay angle of some of the more promising developments, many of which are discussed in their broad economic setting. (A4, ST)

87-A. Automation—What It Means to Foundries. W. R. Jennings. *Foundry,* v. 83, July 1955, p. 115-117.

Some factors that have created the need for automation and what it will bring in the foreseeable future. Photographs. (A5, E general)

88-A. Human Relations in the Foundry Industry. Cal C. Chambers. *Foundry,* v. 83, July 1955, p. 122-124.

Condensation of a talk given before the American Foundryman's Society on the value of personal relationship between management and employees. (A6, E general)

89-A. Personnel Practices of Foundries in the Southeast. H. Ellsworth Steele, William R. Myles and Sherwood C. McIntyre. *Alabama Polytechnic Institute, Engineering Experiment Station, Engineering Bulletin No.* 21, Feb. 1955, 16 p.

Comparisons of employment practices, wage policies and personnel management procedures in southeastern U. S. Photographs, graphs, tables. (A6, E general)

90-A. The Cyclic Flow of Metals. Clement Blazey. *Australasian Engineer,* 1955, May, p. 54-59.

Review of cycles in production and use of metallic objects, followed by scrapping, reworking, and re-use; effects of scrap quality; economic factors; conservation of resources. Flowsheets. (A8)

91-A. Steel Founders Prove That Safety Is No Accident. Jack C. Miske. *Foundry,* v. 83, Aug. 1955, p. 110-113.

Program of the Steel Founders' Society of America to promote safety programs in the plants of the member foundries. Photographs, graph, (A7)

92-A. Automatic Scrap System Handles 55 Tons Per Hour. W. G. Patton. *Iron Age,* v. 176, July 28, 1955, p. 68-70.

A new, fully automatic scrap baling system at the Ford Rouge plant handles up to 55 tons of sheet scrap per hr. Triple compression baler discharges a 1000 to 1100-lb. bale about every 30 sec. Photographs. (A8)

93-A. Cooling Towers for Steel Plants—Why, When, Where and How. Howard E. Degler. *Iron and Steel Engineer,* v. 32, July 1955, p. 105-112; disc., p. 112-113.

Re-use of circulating water by recurrent cooling in a cooling tower will minimize cleaning of tubes, require smaller cooling equipment, as well as conserve the water supply and furnish a ready means for properly treating the water. Tables, graphs, diagrams. (A5)

94-A. The Study of Materials-Handling Systems by a Lead-Shot Analogue. H. G. Jones, W. M. Davies and P. D. Dickerson. *Iron and Steel Institute, Journal,* v. 180, July 1955, p. 255-262 + 2 plates.

Experiments using lead shot as a medium in a model or analogue gives the advantage of flowing from an orifice at a speed independent of the pressure head. The flow pattern through the conveyor system, screens and bunkers associated with the blast furnace and ore-preparation plant was examined on the analogue, and bottlenecks and surplus members were recognized. Table, diagrams, photographs. 6 ref. (A5, D1)

95-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 22, June 1955, p. 255-262.

From "preferred orientation" to "pyrometry." Diagrams, graph, table. (To be continued.) (A10)

96-A. A Simple Treatment for the Reclamation of Tin From Soldered Metal Scrap. W. M. Halliday. *Sheet Metal Industries,* v. 32, no. 339, July 1955, p. 505-506, 508.

Equipment and methods for a lead-wash recovery process. (A8, K7, Sn)

97-A. Progress in the Design and Use of Closed-Circuit Television in Industry. L. Walter. *Sheet Metal Industries,* v. 32, no. 339, July 1955, p. 513-520.

Uses of television in testing equipment, control of mechanical handling and metal processing operations. Photographs, diagrams. 6 ref. (A5, S general)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

98-A. Mechanics of Tool Engineering. XXI. Fundamentals of Plant Layout. Andrew E. Rylander. *Western Machinery and Steel World,* v. 46, July 1955, p. 65-70.

Plant layout illustrated by detailed planning of a plant for machining automotive crankshafts. Diagrams, photographs. (A5, G17)

99-A. Health Hazards From Beryllium. Merril Eisenbud. "The Metal Beryllium". American Society for Metals, p. 620-640.

Health problems, symptoms of infection and methods of handling the material to prevent the health hazard. Photographs, table. 16 ref. (A7, Be)

100-A. (German.) Processing Fine Grain Brass Scrap by Means of Smelting and by Powder Metallurgy. Erich Fetz. *Zeitschrift für Metallkunde,* v. 46, no. 6, June 1955, p. 415-429.

Influence of size, type and composition of scrap on processing method; fluxes, additions and grain size. Advantages and disadvantages of applying powder metallurgy. Tables, graphs. 48 ref. (A8, C21, H14, Cu)

101-A. (Portuguese.) Technical Foundations of the Primary and Transformation Industries in Latin America. Edmundo de Macedo Soares e Silva. *ABM (Boletim da associacao brasileira de metais),* v. 11, no. 38, Jan. 1955, p. 5-30.

Views by a leading Brazilian authority on natural resources, particularly for metallurgical purposes, consumer markets, exchange among Latin-American countries and with other countries, acute problems in know-how and finance. Tables. 14 ref. (A4)

102-A. Approach to Foundry Mechanical Handling. C. M. G. Wallwork. *Institute of British Foundrymen, Proceedings,* v. 47, 1954, p. 34B-44B; disc.p. 44B-46B.

Use of work-study methods to determine handling equipment needs and economics. Tables, flow-chart. (A5, E general)

103-A. The First Half-Century in the History of the Institute of British Foundrymen (1904-1954). T. Makemson. *Institute of British Foundrymen, Proceedings,* v. 47, 1954, p. 257A-275A.

Developments in organization, activities and growth. (A9, E general)

104-A. Quality Metal and Cost Reduction Mark History of Aluminum Production. F. C. Frary. *Journal of Metals,* v. 7, Aug. 1955, p. 885-888.

Historical review of economic aspects of various methods of ore concentration and refining techniques. Photographs, diagrams. (A4, B14, C general, Al)

105-A. Continuous Ion Exchange. R. McNeill, E. A. Swinton and D. E. Weiss. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Aug. 1955, p. 912-921.

Theory and mechanism of action, applications to recovery and concentration of valuable metals, regeneration of pickling and plating liquors, prevention of pollution by waste effluents and purification of valuable metals, such as the rare earths, by chromatographic fractionation. Diagrams, graphs, tables. 21 ref. (A8, L17, C general)

106-A. The Supply of Metallurgists With Graduate Training. Michael B. Bever. *Metal Progress,* v. 68, Aug. 1, 1955, p. 82-85, 168.

Number of masters' degrees in metallurgy granted in the U. S. hit a peak in 1950 and 1951, dipped sharply in 1952 and 1953, but is on the way back up. In the same period the number of doctors' degrees has shown a steady upward trend. Graph, tables. (A3)

107-A. New Developments in Metallurgy. Bruce S. Old. *Metal Progress,* v. 68, Aug. 1, 1955, p. 105-111.

Advances in nuclear energy, gas turbine development, electronics, steel melting and other fields. Photographs. (A general)

108-A. Recovery of Plating Wastes. Louis Weisberg and Edmund J. Quinlan. *Plating,* v. 42, Aug. 1955, p. 1006-1011.

Processes used for the recovery of cyanide and chromate from plating wastes. Diagrams, tables, photographs. 5 ref. (A8, L17, ST)

109-A. Rinse Water Re-Use by Ion Exchange. Charles Bueltman and Albert B. Mindler. *Plating,* v. 42, Aug. 1955, p. 1012-1018.

Summary of the re-use of rinse waters after treatment. Plating baths and rinses, metal recovery and waste treatment. Diagrams, graph, photographs. 6 ref. (A8, L18)

110-A. Practical Methods for Treatment of Metal Finishing Wastes. J. C. Hesler. *Plating,* v. 42, Aug. 1955, p. 1019-1029.

Waste flows, plating bath rinse waters, heavy metal rinse waters and practical applications. Tables, diagrams, photograph. (A8, L17)

111-A. Solids-Liquid Separation in the Treatment of Metal Finishing Wastes. R. F. Ledford. *Plating,* v. 42, Aug. 1955, p. 1030-1036.

Methods of dewatering sludge either for re-use of the water or for simple disposal of the solids by means other than lagooning. Photographs, diagrams, tables, graphs. (A8, L17)

112-A. Water Purification With Activated Carbons. W. A. Helbig. *Plating,* v. 42, Aug. 1955, p. 1044-1045.

Use of activated carbons for the removal of organic impurities from plating rinse waters and impurities from other liquid wastes. (A8, L17)

113-A. Health Hazards in Chromium Plating and How to Prevent Them. W. Kohl. *Henry Brutcher Translation No.* 3490, 5 p. (Abridged from *Metalloberfläche,* v. 5, no. 10, 1953, p. 154B-155B). Henry Brutcher, Altadena, Calif.

Ways in which chromic acid may affect the health of operators, and means for preventing serious trouble and minimizing detrimental effects in general. (A7, L17, Cr)

114-A. (Book.) American Society for Metals, Transactions. Ray T. Bayless and G. G. Fitzgerald, editors, v. 47, 1051 p. 1955. American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. $10.00.

Forty eight papers, most of which were presented at the Thirty-Sixth Annual Convention of the Society, held in Chicago, Nov. 1-5, 1954. These papers were abstracted as preprints and appeared in the Nov. 1954 issue of *Metals Review;* remaining papers are separately abstracted in this issue. (A general)

115-A. (Book.) Metals Reference Book. Colin J. Smithells. v. I-II. 2nd Ed. 967 p. 1955. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. $25.00.

A convenient summary of data relating to metallurgy and metal physics, presented, as far as possible, in the form of tables or diagrams with a minimum of descriptive material. Where information could not otherwise be adequately presented, short monographs are included. (A general)

B

Raw Materials and Ore Preparation

129-B. Solids Concentration. Nathaniel Arbiter. *Chemical Engineering,* v. 62, Aug. 1955, p. 163-177.

Properties of solids, review of separation processes, including sorting, gravity, magnetic, electrostatic and flotation. Photographs, tables, graphs, diagrams. (B14)

130-B. The Canadian Aluminum Industry Today. I. H. Jenks. *Metal Progress,* v. 68, July 1955, p. 90-93.

Expansion of aluminum producing facilities in northwest Canada and use of aluminum in Canadian industry. Photographs, tables. (B10, C general, Al)

131-B. Mineral Flotation With Ultrasonically Emulsified Collecting Reagents. S. C. Sun, L. Y. Tu and E. Ackerman. *Mining Engineering,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 202, July 1955, p. 656-660.

With the aid of emulsifiers, intense high-frequency sound waves are capable of emulsifying any collector in water. The data shows that the ultrasonically emulsified collectors are more effective in floating mineral than the nonemulsified collectors. Tables, graphs, diagrams, photograph. 16 ref. (B14)

132-B. (French.) The Flames of Liquid or Gas-Fuel Industrial Furnaces. Robert Durand and Cohen-de-Lara. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 5, 1955, p. 961-977.

Turbulent diffusion of a gas jet in an unlimited space; method of injecting fuel into industrial furnaces; study of low-calorie-gas flames of openhearth furnaces. Graphs, diagrams, table. (B18, D2)

133-B. (German.) Special Ceramic Materials for Metallurgical Purposes. G. Jaeger. *Metall,* v. 9, no. 9-10, May 1955, p. 358-366.

Review of production, properties, behavior and uses of oxide, sulfide, carbide, nitride, and boride refractories. Tables, photographs. 41 ref. (B19)

134-B. (German.) Slag Saturation by Capillary Action and Diffusion. Rudolf Rasch. *Sprechsaal,* v. 88, no. 11, June 5, 1955, p. 245-248.

Distinguishes between surface diffusion, boundary-plane diffusion and lattice diffusion of slag in refractories. Effects of melting point of slag when dissolved in refractory material. Diagrams, graphs. 11 ref. (B19, B21)

135-B. (Polish.) New Types of Basic Refractories. W. Szymborski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 85-90.

Scarcity of magnesite deposits in Poland has necessitated a production technology of stabilized dolomite clinker as a substitute. Development principles, properties and advantages of the product. Tables, diagrams, graph. 14 ref. (B19)

136-B. (Russian.) Chemical-Metallurgical Properties of Poor Complex Iron Ores and the Best Methods for Their Complex Utilization. D. P. Bogatskii and G. G. Urazov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1955, no. 3, Mar., p. 108-121.

Describes so-called "oxidized" iron-nickel ores from various formations in the Soviet Union. Graphs, diagram. 20 ref. (B14, Fe, Ni, Co)

137-B. (Russian.) Investigation of the Physical-Chemical Properties of Slag Melts. L. A. Shvartsman and A. M. Samarin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1955, no. 4, Apr., p. 73-97.

Surface tension, viscosity, density and electrochemical studies of various slag systems. Cryoscopic measurements. Tables. 41 ref. (B21, Li, Mg, Ba, Al, Mg, Fe)

138-B. (Russian). Kinnetics of Sulfide Film Formation on Heavy Metal Oxide Surfaces Under Flotation Conditions. S. I. Mitrofanov, I. A. Strigin, V. G. Kushnikova and G. S. Rozhavskii. *Kolloidnyi Zhurnal,* v. 17, no. 3, May-June 1955, p. 235-241.

Relation of rate of sulfidization to concentration of Na_2S and to temperature, in the case of cerussite and malachite. Graphs. 2 ref. (B14, Cu, Pb, Al, Fe)

139-B. (Slovenian.) Physical-Chemical Conditions for the Hydrometallurgical Recovery of Copper From Yugoslav Copper Ores. Krsto Cazafura and Boris Mejac. *Rudarsko-metalurski zbornik,* 1954, nos. 3-4, p. 191-217.

Chemical and mineralogical makeup of these ores. Chemical composition of flotation concentrates; oxidation-ammonia leaching of minerals and their flotation concentrates; effect of temperature and mixing speed on rate of reaction. Graphs, tables, photographs. 13 ref. (B14, Cu)

140-B. Pelletizing of Iron Ore Concentrates. II. T. L. Joseph. *Blast Furnace and Steel Plant,* v. 43, July 1955, p. 745-752.

Role of oxidation and recrystallization in the bonding of pellets which will resist breakage during handling and shipping. Graphs, micrographs, table, diagram, photographs. 5 ref. (B16, Fe)

141-B. Milling at Lynn Lake. R. T. Drake. *Canadian Mining and Metallurgical Bulletin,* v. 48, no. 519, July 1955, p. 390-395; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 58, 1955, p. 206-211.

Crushing and milling operations on copper-nickel ores. Flowsheet, tables. (B13, Cu, Ni)

142-B. Processing of Monazite. C. S. Acharya. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 2, Jan. 1955, p. 20-23.

Combined gravity, magnetic and chemical treatment of Travancore beach sands for recovery of thorium, uranium and rare earths. 17 ref. (B14, Th, U, EG-g, l)

143-B. Marmora Mine and Plant Ships Pellets to Feed Bethlehem's Blast Furnaces. *Engineering and Mining Journal,* v. 156, July 1955, p. 75-79.

Mine and plant facilities for handling 37% iron ore which is enriched to 65% iron pellets and shipped from Picton, Ont., dock. Flowsheet, photographs. (B16, Fe)

144-B. How Bunker Hill Blends Charge for Better Lead Smelting. *Engineering and Mining Journal,* v. 156, July 1955, p. 83-85.

New $2.5 million Kellogg, Idaho, plant consists of four separate units

—crushing, proportioning, bedding and pelletizing. Flowsheet, photographs. (B14, B16, Pb)

145-B. Iron and Steel in Canada. Gustad P. Contractor. *Iron & Steel,* v. 28, July 1955, p. 347-351.

Feasibility of establishing a primary iron and steel industry in the lower mainland region of British Columbia. Tables, maps. 25 ref. (B10, Fe, ST)

146-B. Occurrence of Beryllium Ores and Their Treatment. W. R. Griffitts and J. J. Norton, Paper from "The Metal Beryllium". American Society for Metals, p. 42-48.

Distribution, occurrence in pegmatites and non-pegmatic rocks, methods of prospecting, exploration, evaluation, beryl mining and world resources. 7 ref. (B10, Be)

147-B. The Refractory Properties of Beryllium Oxide. J. F. White. Paper from "The Metal Beryllium". American Society for Metals, p. 599-619.

Chemical and physical properties and the manufacture and uses of beryllia refractories. Tables, graphs. 91 ref. (B19, P general)

148-B. (French.) **Comparative Study of the Reactivity of Cokes and Their Internal Surface.** Marthe Bastick, Jack Bastick, Michel Moutach and Henrie Guérin. *Comptes rendus,* v. 240, no. 26, June 27, 1955, p. 2524-2526.

Hydro reactivity and carboxy reactivity tests made on different cokes. Study of variation of surface as a function of degree of wear by carbon dioxide and water. Graphs. 4 ref. (B18)

149-B. Titanium in Iron and Steel. A. E. Williams. *Iron & Steel,* v. 28, June 1955, p. 307-310.

Reactions of titanium when used in refining and as an alloying agent. Photograph, tables, graphs. (B22, AY, CI, Fe, Ti)

150-B. Chlorination of Travancore Monazite. II. Separation of Thoria From Rare Earths With Urotropine. B. Sarma and J. Gupta. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Feb. 1955, p. 82-84.

Simple method for precipitating pure thorium hydroxide from the chloride solution by the use of a mixture of urotropine and hydrochloric acid. Tables. 6 ref. (B14, Th)

151-B. Beneficiation of Low Grade Pyrite From Amjor, Bihar. S. K. Banerjee and P. I. A. Narayanan. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Mar. 1955, p. 115-117.

Investigation to determine amenability of the ore to the ordinary ore-dressing methods and to find the grade and recovery that could be obtained. Tables. (B14, Fe)

C

Nonferrous Extraction and Refining

114-C. Basic Problems in the Processing of Nuclear Fuels. III. A. M. Aikin. *Chemistry in Canada,* v. 7, July 1955, p. 44-46, 48.

In the processing of irradiated nuclear fuels, an attempt is made to answer the questions of what must be processed and in what manner, why process it, and disposition of the wastes. Graphs. (C28, UR, Pu)

115-C. Bomb Reduction of Molybdenum Trioxide by Calcium Metal. H. L. Gilbert and F. E. Block. *Electrochemical Society, Journal,* v. 102, July 1955, p. 394-398.

Production of 25-lb. reguli; joining of reguli as a consumable electrode in arc melting to produce ingot; hot forging and rolling to desired form. Photographs, diagrams, micrographs, table. 9 ref. (C26, F22, F23, Mo)

116-C. (French.) **Obtaining Boron by Igneous Electrolysis.** J. L. Andrieux and W. J. Deiss. *Bulletin de la société chimique de France,* 1955, no. 6, June p. 838-841.

Experimental study of 29 electrolytic baths of various composition for obtaining boron. Tables. 9 ref. (C23, B)

117-C. (French.) **Preparation of Germanium by Fused Electrolysis.** Jean-Lucien Andrieux and Marie-Jeanne Barbier Andrieux. *Comptes redus,* v. 240, no. 22, June 1, 1955, p. 2104-2106.

Preparation of germanium by electrolysis of fused alkaline germanates. Tables. 4 ref. (C23, Ge)

118-C. (German.) **Reduction of Zinc Oxide With Carbon Monoxide and Hydrogen.** J. Gerlach and O. Knacke. *Zeitschrift fur Erzbergbau und Metallhüttenwesen,* v. 8, no. 6, June 1955, p. 275-278.

Equilibrium diagram of muffle reaction; experimental determination of reaction rate of zinc oxide with carbon monoxide and hydrogen; function of gas concentration. Table, graphs, diagrams. 1 ref. (C21, Zn)

119-C. Refining at Fort Saskatchewan. Sydney Nashner. *Canadian Mining and Metallurgical Bulletin,* v. 48, no. 519, July 1955, p. 396-410, *Canadian Institute of Mining and Metallurgy, Transactions,* v. 58, 1955, p. 212-226.

Pressure leaching-reduction process for nickel-copper concentrates. Flowsheet, diagrams, photographs, tables. 6 ref. (C general, B14, Cu, Ni)

120-C. Variations and Modifications of Kroll Process for Production of Zirconium Metal. H. L. Gilbert and C. Q. Morrison. *Chemical Engineering Progress,* v. 51, July 1955, p. 320-325.

Development of ways to streamline production methods making the existing furnaces and facilities more effective without additional expenditure for primary equipment. Studies of reduction reactions, zirconium chloride purification and magnesium chloride removal. Photographs, graph, diagrams. 6 ref. (C4, C26, Zr)

121-C. Out of a Vacuum—Tougher Metals. *Steel,* v. 137, July 25, 1955, p. 88-90.

Description and operation of 1000-lb. vacuum melting furnace. Process provides big boost for stress-rupture life. Photographs, graphs. (C25, D8, Q4)

122-C. Preliminary Electric Smelting Research on Philippine Nickeliferous Ores. L. H. Banning and W. E. Anable. *U. S. Bureau of Mines, Report of Investigations* 5129, May 1955, 13 p.

Feasibility studies on production of ferronickel using laterite ores and bagasse. Tables, photographs. (C21, Fe-n, Ni)

123-C. Melting, Refining, and Granulation of Cobalt Powder. J. D. Marchant, L. H. Banning and W. F. Hergert, *U. S. Bureau of Mines, Report of Investigations* 5133, May 1955, 14 p.

Removal of phosphorus and sulfur from a cobalt-nickel concentrate. Production of granules suitable for stockpiling. Photographs, tables. (C21, Co)

124-C. Thermodynamic Considerations in the Preparation of Beryllium Metal. H. H. Kellogg. Paper from "The Metal Beryllium", American Society for Metals, p. 49-62.

Thermodynamic data, sources of data, reduction by calcium metal, halide, thermal and electrolytic reduction, refining by distillation. Tables, graphs. 18 ref. (C general, P12, Be)

125-C. The Fluoride Extraction of Beryllium From Beryl. Henry C. Kawecki. Paper from "The Metal Beryllium". American Society for Metals, p. 63-70.

Basic chemistry, commercial practice, product uses and production of beryllium fluoride. Diagram. 20 ref. (C4, Be)

126-C. The Sulphate Extraction of Beryllium From Beryl. C. W. Schwenzfeier, Jr. Paper, from "The Metal Beryllium". American Society for Metals, p. 71-101.

Production of beryllium hydroxides, oxides and fluorides; thermochemical reduction to beryllium metal; purification and consolidation of beryllium pebbles by vacuum melting and casting. Diagrams, photograpns, table. 6 ref. (C general, Be)

127-C. The Production of Beryllium by the Electrolysis of Beryllium Chloride. C. E. Windecker. Paper from "The Metal Beryllium". American Society for Metals, p. 102-123.

Preparation of unrefined beryllium chloride and the subsequent purification by electrolysis. Diagrams, graphs, photograph. 7 ref. (C23, Be)

128-C. Experimental Reductions of Beryllium. T. T. Magel. Paper from "The Metal Beryllium". American Society for Metals, p. 124-135.

Reduction of beryllium halides with alkali and alkaline earth metals; reduction of beryllium oxide; electrolytic reduction and other reduction experiments. Diagrams. 36 ref. (C general, Be)

129-C. (German.) **Amalgam as an Auxiliary Medium in Metallurgical Research.** Franz Lihl. *Zeitschrift für Metallkunde,* v. 46, no. 6, June 1955, p. 434-441.

Low-temperature formation of alloys by the reduction and amalgam methods, preparation of binary, ternary and quaternary alloys by amalgamation process, limits of field of application. Graphs, phase diagrams. 21 ref. (C29)

130-C. (Polish.) **The Process of Zinc Rectification.** Aleksander Krupkowski and Henryk Fik. *Archiwum Gornictwa i Hutnictwa,* v. 2, no. 3, 1954, p. 243-352.

Balances necessary to estimate the elements of working intensity of the rectification furnace and, especially, for the evaporation chambers, first stage condensation chambers and condensors. Tables, graphs, diagrams. 17 ref. (C22, Zn)

131-C. (German.) **Mechanism of the Cyanidation Method in the Metallurgy of Gold.** E. Abel. *Monatshefte für Chemie,* v. 86, no. 3, 1955, p. 536-539.

A new interpretation of the mechanism based on autoxidation. 17 ref. (C24, Au)

132-C. Slag Fuming Furnaces Recover Zinc and Lead From Copper Slag. R. E. Mast and G. H. Kent. *Journal of Metals,* v. 7, Aug. 1955, p. 877-884.

Equipment and procedures for use with reverberatory furnace slag. Photographs, graphs, tables, diagram, flowsheet. (C general, A8, Cu, Zn, Pb)

133-C. (French.) **The Extraction and Refining of the Platinum Metals From Their Sulphide Ores.** A. R. Raper

and F. S. Clements. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 447-456.

Recovery of precious metals from the concentrates of anodic slimes, resulting from the electrolytic refining of copper and nickel by complex chemical processes. Table, diagrams. 25 ref. (C23, Pt)

D

Ferrous Reduction and Refining

264-D. Oxygen Improves Competitive Position of Older Openhearth. G. C. Lawton. *Iron Age*, v. 176, July 14, 1955, p. 112-113.

Much improved fuel input, greater flexibility in scrap used, faster meltdown and few long soaking periods are advantages. Photograph. (D2, ST)

265-D. (Portuguese.) **Production of Aluminothermic Ferrochromium and Ferrotungsten.** Dalcy Horta Machado. *ABM (Boletim da associacao brasileira de metais)*, v. 10, no. 37, Oct. 1954, p. 385-389.

Brazilian patent for new variation of thermite process. Results compared with those by electric furnace process. (D8, Fe, Cr, W)

266-D. (Hungarian.) **Decreasing the Burning Losses of Deoxidizing Materials (Manganese, Silicon, Aluminum) and the Quantity of Endogenous Slag of Steel in Open-Hearth Steel Production. II.** Dezso Csépai. *Kohaszati Lapok*, v. 10, no. 6, June 1955, p. 257-262.

Industrial experiments for decreasing endogenous slag inclusions in steel. Detailed production data on low sulfur and phosphorus steel production. Photograph, micrograph, tables. (D2, ST)

267-D. (Hungarian.) **Production of Ferromolybdenum Directly From Molybdenum Disulfide.** Laszlo Visnyovszky. *Kohaszati Lapok*, v. 10, no. 6, June 1955, p. 272-275.

Various production methods and their economic comparison for yield. Tables, graphs. 6 ref. (D8, Fe, Mo)

268-D. (Polish.) **Desulfurization of Blast Furnace Pig Iron. A. Ofiok.** *Prace Instytutow Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 106-114.

Use of soda, lime salt or sodium hydroxide outside the furnace; evaluation of their relative effectiveness. Tables, graphs, diagrams. 25 ref. (D1, CI)

269-D. (Russian.) **Kinetics of the Distribution of Sulfur Between Liquid Iron and Slag.** O. A. Esin and V. N. Shikhov. *Doklady Akademii Nauk SSSR*, v. 102, no. 3, May 21, 1955, p. 583-586.

Related rate of desulfurization of molten iron by basic and acid slags to concentration of sulfur in the slags. Graphs, table. 6 ref. (D general, P12, Fe)

270-D. (Russian.) **Influence of Liquid-Steel Temperature on Ingot Structure.** A. P. Pronov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 58-62 + 1 plate.

Macrostructure and crystallization pattern of a basic openhearth steel ingot. Optimum dimensions of ingot and adequate thermal insulation of deadhead part, as well as proper degree of overheating above melting point. Photograph, diagram. 7 ref. (D9, M28, ST)

271-D. (Russian.) **Investigation of the Kinetics of the Dephosphorization of Liquid Iron by Slag.** O. A. Esin and V. N. Shikhov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 79-89.

Compares distribution indices of phosphorus and its radioactive isotope; chemical analysis and radiation measurement; effect of phase surface separation and height of slag layer; rate of direct and reverse reactions; effect of original phosphorus concentration in metal and slag composition. Graphs, tables. 12 ref. (D general, P12, Fe)

272-D. (Russian.) **Activity of Oxygen in Liquid Iron.** V. V. Avtrin, A. Iu. Poliakov and A. M. Samarin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 90-107.

Experimental equipment for preparing gas mixtures; quartz high-frequency melting furnace. Relation of coefficient of activity of oxygen to gas temperature and composition. Tables, graphs, diagrams, photographs, micrograph. 15 ref. (D1, P12, Fe)

273-D. (Russian.) **Study of the Static Pressure Change With Respect to the Blast Furnace, Height and Measurement of Temperature in the Hearth.** N. N. Chernov, I. F. Domnitskii and G. S. Manchenko. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 63-72.

New method of regulating furnace pressures. Reliable temperature measurement at tuyeres, etc., provide basis for automatic control of heating. Graphs, diagrams. 5 ref. (D1, S16, S18)

274-D. Pioneering in New Developments in a Specialty Steel Mill. H. George De Young. *American Iron and Steel Institute, Preprint*, 1955, 47 p.

Developments in continuous casting, scarfing, rolling, pickling and annealing. Photographs, tables, graphs, micrographs, diagrams. (D9, F general, ST)

275-D. The Role of Slag Composition in Open Hearth Desulphurization and Oxidation. H. L. Bishop, T. B. King and N. J. Grant. *American Iron and Steel Institute, Preprint*, 1955, 18 p.

Considers the oxidizing power of the slag and the partition of sulfur between slag and metal as these are related to slag composition. Graphs, phase diagrams. 12 ref. (D2)

276-D. Cleaning of Open Hearth Stack Gases. Leslie Silverman. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 735-744, 752.

Requirements for cleaning, present methods of cleaning, agglomeration studies and their relation to filtration studies and conclusions drawn from the study. Photographs, micrographs, diagrams, tables, graph. 5 ref. (D2)

277-D. Pneumatic Steelmaking Processes. II. D. J. Carney. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 753-760.

Use of oxygen in acid bottom blown bessemers and the processes, requirements, control and reactions of the basic bessemer. Tables, graphs. 11 ref. (To be continued.) (D3, ST)

278-D. The Use of Sintered Pyrrhotite Residues in the Production of Low Phosphorus Pig Iron. L. A. Miller. *Blast Furnace and Steel Plant*, v. 43, July 1955, p. 761-764, 794-795.

Operation of the furnace with a burden of 88% Copperhill sinter and 12% Brown Ore. Description of furnace, and low and high blast heat practice. Tables, diagrams, graph. (D1, CI)

279-D. Synchronous Condensers for Steel Mill Service. E. I. Pollard. *Iron and Steel Engineer*, v. 32, July 1955, p. 129-134; disc., p. 134-135.

Use of a synchronous condenser, either alone or in combination with a buffer reactor or a series capacitor or both, to provide an effective method of keeping voltage flicker due to reactive load swings of an arc furnace within acceptable limits. Diagrams, graphs, photographs. 7 ref. (D5)

280-D. Vacuum Furnaces Will Make Better Steels. *Iron and Steel Engineer*, v. 32, July 1955, p. 136, 139-140.

Design features, application, production, control and operation of the furnace; production and application of specialized vacuum melted alloys. Diagram, photographs. (D8, ST)

281-D. (Czech.) **Experimental Comparison of Properties of Carbon Steel Made in Acid and in Basic Lined Open-Hearth Furnace.** Zdenek Eminger and Frantisek Kinsky. *Hutnické Listy*, v. 10, no. 6, June 1955, p. 329-345.

Compares mechanical physical, physico-chemical and technological properties. Cast and forged carbon-vanadium steels, for the production of large crank shafts, are produced especially for this study. Tables, graphs, diagrams, photographs, micrographs. 8 ref. (D2, Q general, ST)

282-D. (French.) **Influence of Temperature During Refining on the Nitrogen Content of Basic Bessemer Steel.** B. Trentini, P. Leroy and M. Gombert. *Revue de métallurgie*, v. 52, no. 5, May 1955, p. 418-427.

Utilization of a two-color pyrometer, at the bottom of a 19-ton converter, and direct recording of the refining permits a comparison of temperature curves corresponding to various additions, and facilitates a study of the effect of cooling additions charged during refining. Graphs, tables. 15 ref. (D3, CN)

283-D. The Axial-Flow Compressor in Industry. A. Schramm. *Brown Boveri Review*, v. 41, no. 11, Nov. 1954, p. 395-404.

Performance characteristics of compressors for use in blast furnaces, bessemer converters, chemical plants and wind tunnels. Graphs, photographs, diagram. 14 ref. (D1, D3)

284-D. Foundry Practice. IX. The Molten Metal. William H. Salmon and Eric N. Simons. *Edgar Allen News*, v. 34, July 1955, p. 161-162.

Preparation of steel in the bessemer converter and electric arc furnace. Special procedures for production of steel for casting. Graphs, tables. (To be continued.) (D3, D5, E10, ST)

285-D. Phase Equilibrium Studies of Steel Plant Refractories Systems. V. E. F. Osborn. *Industrial Heating*, v. 22, July 1955, p. 1459 + 4 pages.

Effects of alumina and chromium oxide on refractories for steelmaking. Graphs, diagrams. 1 ref. (D general, B19)

286-D. Brazilian Charcoal Blast Furnace Practice. R. G. Walker. *Iron & Steel*, v. 28, June 1955, p. 297-300.

Improving operations, comparison with other processes, low-shaft blast furnaces, development of charcoal blast furnaces. Table, diagrams. (D1)

287-D. Ore Fines Utilized in Low Shaft Furnace to Produce Thomas Pig Iron. P. Coheur. *Journal of Metals*, v. 7, Aug. 1955, p. 872-876.

Pilot plant studies for production of low-silicon pig iron from raw

materials which cannot be used in conventional blast furnaces because of fineness or other reasons. Tables, graphs, diagram. 5 ref. (D1, CI)

288-D. Vacuum Steel: Boost to Bearings. Leland D. Cobb. *Steel,* v 137, Aug. 15, 1955, p. 136-137.

Elimination of inclusions in ball bearing toolsteels by use of vacuum melting. Micrographs, photograph. (D8, T7, TS)

289-D. Study of the Deoxidation of Steel by Vacuum Melting. J. Thomas and L. Moreau. *Henry Brutcher Translation No.* 3350, 10 p. (From *Revue de Métallurgie,* v. 43, nos. 7-8, 1946, p. 204-207.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 2-161, 1947. (D8, ST)

290-D. Investigation of the Oxidizing Zone in a Blast Furnace Working on Blast of Normal and of Increased Moisture Content. N. N. Chernov. *Henry Brutcher Translation No.* 3449, 15 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN,* 1954, no. 7, p. 105-115.) Henry Brutcher, Altadena, Calif.

Review of previous work on the extent of the oxidizing zone; conflicting U. S. and Russian opinions regarding the effect of water enrichment of the blast and size of the oxidizing zone; possible explanations of effect of increased moisture content of blast. Graphs, diagrams. 15 ref. (D1)

291-D. The Hot-Blast Cupola in the Steel Plant. Th. Kootz and H. Rellermeyer. *Henry Brutcher Translation No.* 3513, 16 p. (Abridged from *Archiv für das Eisenhuttenwesen,* v. 26, no. 1, 1955, p. 1-8.) Henry Brutcher, Altadena, Calif.

Use of cupola iron as hot metal for the openhearth furnace to boost production; investigational set-up, procedure and comments on operational technique. Tables, graphs, diagrams. 10 ref. (D2, E10, ST)

292-D. Processes Occurring in the Bosh of the Blast Furnace. I. P. Bardin and M. Ya. Ostroukhov. *Henry Brutcher Translation No.* 3525, 12 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN,* 1954, no. 3, Mar., p. 72-81.) Henry Brutcher, Altadena, Calif.

Importance of state of materials in this zone for the permeability of the stock column; investigational procedure and sampling technique. Micrographs, graphs, tables. 2 ref. (D1)

293-D. (French.) Japanese Tests on the Injection of Oxygen-Enriched Blast and Powdery Materials Into the Crucible of a Small, Experimental Blast Furnace. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 6, 1955, p. 1061-1086.

Injection permits control of cast iron composition and of crucible temperature and rapid re-establishment of normal operating conditions. Tables, diagrams, graphs. (D1, CI)

294-D. (French.) Inquiry on the Shutting Down of Converters for Repairing Lining or Changing the Bottom. Lanquetin. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 6, 1955, p. 1215-1226.

Presents tabulation of various steps and precautions in the operations. Tables. (D3)

295-D. (French.) Contribution to the Study of the Role of Manganese in Refining in the Thomas Converter. P. Leroy. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 6, 1955, p. 1227-1233.

Investigates influence of manganese content of cast irons on quality of steel produced. Graphs. (D3)

296-D. (French.) Desulfurization by Stirring With Slags. René Perrin. *Revue de métallurgie,* v. 52, no. 6, June 1955, p. 473-476

Principles of steel desulfurization processes, especiallly stirring with melted slags, and fundamentals of a new method of simultaneous desiliconization and desulfurization of steel, using a single slag of appropriate composition. (D3, ST)

297-D. (Japanese.) On the Bessemerizing Process in the Hearth of Blast Furnace. Kuro Kanamori. *Institute of Industrial Science, Report, (University of Tokyo),* v. 4, no. 4, Mar. 1955, 64 p.

Production of pig iron with low sulphur (0.01%); activation of nickel and chromium in the furnace bath. Graphs, diagrams, tables. (D1, Fe)

298-D. (Swedish.) A Special Type of Ingot Cracks Caused by Certain Impurities. Paul Björnson and Helmer Nathorst. *Jernkontorets Annaler,* v. 139, no. 6, 1955, p. 412-438.

Special type of ingot cracks are found when steel contains copper and tin, which segregate to the primary grain boundaries on cooling, forming precipitate of probably liquid copper-tin phase. Mechanism of crack formation. Tables, micrographs, diagrams. 12 ref. (D9, N7, ST)

E
Foundry

281-E. Foundry Practice. IX. The Molten Metal. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 34, June 1955, p. 132-133.

Advantages and disadvantages of cupola melting and some factors in the making of cast steel. Table, diagram. (To be continued.) (E10, CI)

282-E. Spinning Cylinder Sleeves at Perfect Circle. Kenneth L. Mountain. *Foundry,* v. 83, July 1955, p. 108-114.

Development of a method for centrifugally casting cylinder sleeves. Cooling problem, cupola charge, automatic spraying of coating, flexibility in size of castings. Photographs, micrograph. (E14, CI)

283-E. Better Castings With Less Metal. A. J. Stone, H. B. Kinnear and A. R. Fraser. *Foundry,* v. 83, July 1955, p. 118-121.

Use of rapidly igniting exothermic compounds on open risers of castings and on hot tops of ingots to eliminate excessive piping and shrink cavities caused by premature freezing of the feeding metal. Discusses delaying of skin formation on top surface of the riser, feeding a bronze casting, and their application to aluminum. Photographs. (E23, D9, AY, CI, Cu, Al)

284-E. Centrifugal Casting With a German, Water-Cooled Machine. P. J. Ahern and J. F. Wallace. *Foundry,* v. 83, July 1955, p. 130-135.

Design and operation of a German centrifugal casting machine used for large-scale gun tube manufacture and a comparison with its counterpart in the U.S.A. Photographs, micrographs, diagrams. 6 ref. (E14)

285-E. Aspects of Steelfoundry Practice. H. Hart. *Foundry Trade Journal,* v. 98, June 16, 1955, p. 645-653.

Atmospheric cores, partial mold, reversal during casting, dry sand molding, scabbing of molds and cores, porosity and fireclay runner sleeves. Diagrams, photographs, graph, table. 8 ref. (E11)

286-E. Influence of Grain Size on Structure, Pressure-Tightness and Tensile Properties of Sand-Cast Bronzes and Gunmetals. A. Cibula. *Foundry Trade Journal,* v. 98, June 30, 1955, p. 713-726.

It is concluded that the mode of solidification varies considerably with pouring conditions. Solidification in alloys cast at high temperatures, without a grain refiner, proceeds largely by skin-growth; with grain refiners or casting at low temperature, equiaxial grains are nucleated throughout and "pasty" solidification occurs. Diagrams, graphs, micrographs, tables, photographs. 26 ref. (E11, E25, Cu)

287-E. Direct Chill Casting of Light Metal Billets. Herbert Capitaine. *Metal Industry,* v. 87, July 1, 1955, p. 9-11.

A consideration of the processes of pretreatment of the melt which affect the quality of the cast billets and discussion of means whereby sound billets and rolling slabs can be produced. Diagrams, tables. 4 ref. (E16, C5, Al)

288-E. (French.) Binding Agents for Self-Drying Cores. Pierre Nicolas. *Fonderie,* 1955, no. 111, Apr., p. 4474-4482.

Factors influencing hardening of the self-drying sand and difficulties in using this sand. Graphs. (E18)

289-E. (German.) Effect of the Metallurgical Properties of the Steel-Mold Casting on the Tendency to Hot Cracking. Hans Heyer and Eugen Piwowarsky. *Giesserei,* v. 42, no. 11, May 26, 1955, p. 273-279.

Device for testing the effects of casting temperature, grain size, and carbon, phosphorus and sulfur contents on susceptibility to hot cracking; test results. Micrographs, graphs, diagrams, photographs, tables. (E12, CI)

290-E. (German.) The Behavior of Molding Sand During the Molding and Casting Process of Cast Iron and the Testing of Molding-Sand Properties. Wilhelm Wegener. *Giesserei,* v. 42, no. 11, May 26, 1955, p. 280-285.

Effect of water and coal dust content on the gas permeability of sand molds; suggestions for the continuous control of sand molds, especially with respect to proper grain size and type of coal dust. Graphs, tables, micrographs. (E18, CI)

291-E. (German.) Temperatures of the Acid Refractory Linings of Small Converters. W. Bading. *Giesserei,* v. 42, no. 11, May 26, 1955, p. 288-290.

Rate of temperature rise and changes, average temperatures at different points of the converter lining. Diagrams, graphs, table. 9 ref. (E10, CI)

292-E. (German.) Working With the Hot-Blast Cupola Furnace. Willi Haas. *Giesserei,* v. 42, no. 11, May 26, 1955, p. 291-292.

Principles of operating, charging and servicing. Tables. (E10, CI)

293-E. (German.) Progress in the Construction of Recuperators for Hot-Blast Cupola Furnaces. Alfred Schack. *Giesserei,* v. 42, no. 12, June 9, 1955, p. 302-307.

Different types of modern recuperators. Diagrams, photographs. 5 ref. (E10)

294-E. (Hungarian.) The Role of Ammonium Bifluoride in Magnesium Casting. Gyula Emöd and Pal Németh. *Ontöde,* v. 6, no. 6, June 1955, p. 127-131.

Experiments and results on sub-

stituting ammonium bifluoride for boric acid and sulfur during the sand casting of magnesium and its alloys. Table, photographs. 6 ref. (E11, Mg)

295-E. (Polish.) **Precision Casting by Lost Wax Method.** H. Zakowa. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 148-151.

Techniques used in preparation of patterns and molds for precision casting with reference to raw materials and equipment required. Precision casting of cutting tools and economic advantages obtained by application of this method. Photographs, micrograph. 14 ref. (E15)

296-E. (Portuguese.) **"Wet Sands" Used in "Casting Sands".** Carlos Dias Brosch. *ABM (Boletim da associacao brasileira de metais),* v. 10, no. 37, Oct. 1954, p. 363-380.

Preparation and properties of molding-sand mixtures having high moisture contents. Graphs, tables. (E18)

297-E. (Russian.) **Peculiarities in the Production of Heat-Resistant Castings.** V. P. Desnitskii. *Liteinoe Proizvodstvo,* 1955, no. 6, June, p. 1-4.

Main defects in austenitic steel castings; influence of steel composition versus method of casting; new method of casting which eliminates most of the defects. Drawings, micrographs. 5 ref. (E general, CI)

298-E. (Russian.) **Casting the Body of the Turbine Wheel for the Kuibyshev Hydroelectric Plant.** N. D. Vasil'ev. *Liteinoe Proizvodstvo,* 1955, no. 6, June, p. 4-9.

Technique of mold preparation and casting, using over 110 tons of liquid metal. Graph, photographs, tables, diagrams. 1 ref. (E19)

299-E. (Russian.) **Mechanization of the Lost Wax Casting Method.** A. V. Baranov, V. N. Ivanov, and N. M. Osokin. *Liteinoe Proizvodstvo,* 1955, no. 6, June, p. 9-15.

Design of machines for mixing wax; ovens for melting-out the investment. Diagrams. (E15)

300-E. (Slovenian.) **Clay as a Binder in Synthetic Molding Mixtures.** Ciril Pelhan. *Rudarsko-metalurski zbornik,* 1954, nos. 3-4, p. 259-273.

Use of semisynthetic and synthetic sands and various binders; mineralogical composition and physical properties of clays. Tables, diagrams. 6 ref. (E18)

301-E. (Swedish.) **Automatic Molding Machines.** J. Broberg, L. B. Lindh and K. Akesson. *Gjuteriet,* v. 45, no. 5, May 1955, p. 61-65.

General views on automatic molding, considering patterns, molding materials, transport of flasks and mold parts and maintenance of the machines. Descriptions of some Swedish automatic molding machines. Photographs, diagrams. (E19)

302-E. Brass Foundry Modernization Raises Plant Efficiency. Edwin A. Swensson and James F. Gallagher. *Foundry,* v. 83, Aug. 1955, p. 86-89.

Through mechanization a foundry meets demands for lower-cost castings and higher production rates. Photographs, tables. (E general, Cu)

303-E. New Centrifugal Process Uses Sand-Resin Lining. Edwin Bremer. *Foundry,* v. 83, Aug. 1955, p. 90-93.

Process which combines advantages of the steel mold and metal flask with rammed sand lining methods of casting. Photographs. (E14, CI)

304-E. Water-Cooled Cupola Brightens Future for Consistent Control of Castings. Leonard H. Wisner. *Western Metals,* v. 13, July 1955, p. 52-54.

Description, operation and advantages of melting unit capable of positive control of the refining action and producing a superior quality metal for Meehanite castings. Photographs, diagram, table. (E10, CI)

305-E. The Brass Foundry. Harry St. John. *Foundry,* v. 83, Aug. 1955, p. 94-97.

How casting costs can be cut and quality improved through the possibilities inherent in these four elements: men, machines, metal and sand. Photographs. (E11, Cu)

306-E. Mechanizing a Small Foundry. William G. Gude. *Foundry,* v. 83, Aug. 1955, p. 98-100.

Description of a small modern foundry with a high degree of mechanization in all phases of the work. Photographs, diagram. (E general)

307-E. Huge Castings Required for Heavy Forging Presses. *Foundry,* v. 83, Aug. 1955, p. 101-103.

Production of large castings used in the construction of heavy forging presses. Photographs. (E11, T5, CI)

308-E. So You Are Going to Try Shell Molding? John G. Steinebach. *Foundry,* v. 83, Aug. 1955, p. 104-107.

Practical advice and operational hints for foundries which are contemplating installation of shell molding operation. Photographs. (E16)

309-E. A New Role for Pattern Shops. Al Brocklebank and William J. Sikula. *Foundry,* v. 83, Aug. 1955, p. 108-109.

Role of patternmaker as a design consultant on foundry techniques and as a go-between from the designer and foundry. Diagrams, photographs. (E17)

310-E. Making Precision Castings in Glass Molds. *Foundry,* v. 83, Aug. 1955, p. 140, 142-143.

Results of tests using this method for the production of jet engine buckets and vanes show that 90% of the castings met precision standards on surface finish. Photographs. (E19)

311-E. Metal and Mould Research on Steel Castings. I. Solidification Mechanism. J. A. Reynolds and A. Preece. *Foundry Trade Journal,* v. 99, July 14, 1955, p. 31-38.

Problems of shrinkage unsoundness and an analysis of experiments to establish directional solidification and control; relationship between microporosity, crystal structure and tensile properties; effect of various phenomena on tensile and other physical properties. Photographs, micrographs, diagrams, graph. 9 ref. (To be continued.) (E25, Q23, M27, CI)

312-E. Formation of Shrinkage Defects in Grey Iron Castings. J. Gittus. *Iron & Steel,* v. 28, July 1955, p. 331-335.

Castings made in dried sand molds are sounder than those made in green sand, which is attributed to the higher ridigity of the dry mold, with the result that the size of a pipe in the casting is reduced by expansion of the sand and by that of the solidifying eutectic. Photographs, diagrams, graphs. (To be continued.) (E25, CI)

313-E. Metal Handling for Diecasting. H. K. Barton. *Mechanical World and Engineering Record,* v. 135, July 1955, p. 312-314.

Recent advances in automatic transfer methods. Diagrams, photographs. (E13, A5)

314-E. Induction Furnace Linings. Herbert Capitaine. *Metal Industry,* v. 87, July 15, 1955, p. 45-46.

Preparation of refractories for light alloys used in furnaces having capacities of over two tons. Graph. 1 ref. (E10, Al)

315-E. The Melting and Casting of Beryllium. P. Corzine and A. R. Kaufmann. Paper from "The Metal Beryllium". American Society for Metals, p. 136-151.

Crucible and mold materials, protective atmospheres; melting equipment; casting defects and structures; centrifugal casting; refining effects of vacuum melting; comparison of cast beryllium with other forms. Diagrams, photographs. 5 ref. (E general, Be)

316-E. Some Factors Affecting Fluidity of Metals. D. V. Ragone, C. M. Adams and H. F. Taylor. Paper from "The 1955 Heat Transfer and Fluid Mechanics Institute". University of California. 33 p.

Equations derived relating fluidity of pure metals to metal properties and test variables. Fluidity was found to vary directly with channel diameter, volumetric heat of fusion, applied pressure head and superheat, but varied inversely with friction factor, temperature difference between metal and mold and heat-absorbing ability of the mold. Change in viscosity had but a small effect. Graphs, diagrams, tables. 46 ref. (E25)

317-E. (English.) **Solidification of Sand Castings.** Gora Ohira. *Technology Reports, Tohoku University,* v. 19, no. 2, 1955, p. 201-223.

Measurement of temperature in the metal and in the mold provides a versatile technique for analyzing the solidification mechanism. Investigates position and optimum size of the riser and its effect on casting. Tables, diagrams, graphs. 9 ref. (E25, Al)

318-E. (German.) **Characteristic Properties of Alloys for Pressure Casting.** Gustav Lieby. *Giesserei,* v. 42, no. 14, July 7, 1955, p. 357-361.

Solidification of alloys in pressure casting, basic properties of alloy used, physical and mechanical properties of finished product. Photograph, graphs, tables, diagrams, micrographs. 1 ref. (E13, E25, Q general, P general)

319-E. (German.) **Smelting and Heat Crackability of Hard Manganese Cast Steel.** F. C. Althof, *Giesserei,* v. 42, no. 14, July 7, 1955, p. 362-370.

Melting procedure, influence of composition of mold material on hot cracking, mechanism of crack formation and method of prevention. Photographs, micrographs, tables, graphs, diagrams. 29 ref. (E10, E25, CI)

320-E. (Polish.) **Research on the Use of Magnesium Ferrosilicon Alloys and "Electron" Alloy Scrap for the Production of Cupola Nodular Iron.** Jerzy Piaskowski. *Przeglad Odlewnictwa,* v. 4, no. 5, May 1954, p. 132-138.

Experiments show that their copper and aluminum content have little effect on strength properties of the iron; results improved with lower magnesium content and through normalizing. Micrographs, tables. (E25,Q general, CI)

321-E. (Polish.) **Capacity Drying of Foundry Cores.** Tadeusz Skrzypek. *Przeglad Odlewnictwa,* v. 4, nos. 7-8, July-Aug. 1954, p. 219-224.

Core materials, physico-chemical and thermal phenomena during drying, drying kilns, operations and design economy. Graphs, tables, photographs, diagrams. 9 ref. (E21)

322-E. (Swedish.) **Mold Reaction in Nonferrous Metal Castings.** W. A. Baker. *Gjuteriet,* v. 45, no. 6, June 1955. p. 75-81.

Gas absorption in nonferrous casting alloys, reaction mechanisms, effects of gas absorption by mold reaction on the properties of castings. Tables, diagrams, photographs, graphs. 8 ref. (E19, EG-a)

323-E. Some Aspects of Shell-Moulding Technique. D. F. Bailey. *Institute of British Foundrymen, Proceedings,* v. 47, 1954, p. 250A-256A.

Shell making materials, mixtures, and methods; causes and remedies for mold failures. Table, graphs, photographs. (E16)

324-E. Quantity Production of Engineering Castings. J. Burrell. *Institute of British Foundrymen, Proceedings,* v. 47, 1954, p. 1B-14B.

Changes in plant layout and production methods necessitated by increase in nature of production from jobbing to mass production of tractor parts. (E general, CI)

325-E. Operating Experiences With Hot-Blast Cupolas in Great Britain. F. C. Evans. *Institute of British Foundrymen, Proceedings,* v. 47, 1954, p. 56B-65B; disc., p. 65

Progress report to show what results have been obtained, so far, using British fuels and raw materials and operating under British conditions. Diagrams, graphs, photograph, table. (E10, CI)

326-E. Carbon and Alloy Steel Castings. *Iron & Steel,* v. 28, June 1955, p. 291-295.

Different aspects of technical control exercised by the metallurgical, methods and maintenance departments. Examples of production in the medium, heavy, and induction divisions. Diagrams, photographs, table. (E11, CN, AY)

327-E. Moulding Powder Filler From Jute Sticks. P. K. Ghosh, T. Bhowmik and P. K. Bose. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Mar. 1955, p. 121-123.

Use of wood flour, made from jute sticks after removal of fiber, as a filler in molding powders. Tables. 4 ref. (E19)

328-E. Pressure Die Casting at the Works of the Wolverhampton Die Casting Co. Ltd. *Machinery (London),* v. 87, July 29, 1955, p. 253-261.

Equipment and operating techniques. Photographs. (E13, Zn)

329-E. Economical Production of Foundry Molds by the Carbon Dioxide Process. W. Saubermann. *Henry Brutcher Translation No.* 3528, 8 p. (Abridged from *Giesserei-Praxis,* v. 73, no. 7, 1955, p. 130-132.) Henry Brutcher, Altadena, Calif.

Proposed highly mechanized mold making process and machine; possibility of working the carbon dioxide process into fully mechanized foundry practice. Principles of mold making machine; extension of its scope by fitting different blowing or ramming heads. (E19)

330-E. On the Application of the Carbon Dioxide Process (by Schmidt and Philipp) in Light-Metal Foundries. *Henry Brutcher Translation No.* 3529, 5 p. (From *Giesserei-Praxis,* v. 72, no. 7, 1954, p. 117-118.) Henry Brutcher, Altadena, Calif.

Practical application of the process for aluminum and magnesium castings; time saving factors in making different types of cores and molds of extremely complicated shape. (E19, E21, Al, Mg)

331-E. (Czech.) Pouring of Heavy Steel Castings in Chemically Hardened Sand Molds. Vaclav Lupac and Karel Pluhar. *Slévarenstvi,* v. 3, no. 6, June 1955, p. 161-163.

Production experience; advantages of carbon dioxide hardening process. Graphs, photographs. (E19, E21, E23, CI)

332-E. (Czech.) Alloying of Cast Iron in Cupola by Means of Slags. Bretislav Sochor. *Slévarenstvi,* v. 3, no. 6, June 1955, p. 169-172.

Titanium and boron pass from slags into cast iron, producing the same results as is obtained by addition of the corresponding ferroalloys. Micrographs, spectrograms. (E10, B22, CI)

333-E. (Dutch.) Mold Reaction of 90/10 Aluminum-Magnesium Alloy. H. Boswinkel. *Metalen,* v. 10, no. 12, June 30, 1955, p. 237-240.

Definition of mold reaction; boric acid and beryllium as inhibitors; influence of sodium and beryllium inhibitors on the alloy properties. Table, graphs. 8 ref. (E19, Al, Mg)

334-E. (Pamphlet.) Foundry Manual for Sand Casting Aluminum-10 Per Cent Magnesium Alloy. P. D. Frost. PB 111577. 122 p. 1954. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $3.25.

Contains sections on melting, gating and risering, hot and cold cracking, and properties of sand. (E11, Al)

335-E. (Book.) Institute of British Foundrymen, Proceedings, (Annual Volume), v. 47, 1954, 396 p. Institute of British Foundrymen, Saint John Street Chambers, Deansgate, Manchester, 3, England.

Consists of 30 papers presented to the Annual General Meeting of the Institute and a selection of the Papers presented to branch meetings. Most papers have been previously abstracted as preprints or as published in *Foundry Trade Journal.* The remaining papers are abstracted separately. (E general)

F

Primary Mechanical Working

169-F. Extruded Low Carbon Steels. R. L. Hugo. *Product Engineering,* v. 26, July 1955, p. 129-131.

Hydraulic presses extrude glass-coated billets through low-cost dies, producing complex sections with final dimensions equal to AISI cold finished bar tolerances. Current size limitations, typical applications, properties obtainable. Photographs. (F24, CN)

170-F. Large Forgings — Current German Viewpoints on Design and Production. H. Gummert. *Steel Processing,* v. 41, July 1955, p. 421-425.

Raw materials, heat treatment, working and shaping, testing procedures, machinery for production of forgings. Tables, diagrams. 3 ref. (F22)

171-F. Unusual Drop Forging of Crawler Tractor Truck Wheels. Charles E. Warner. *Steel Processing,* v. 41, July 1955, p. 433-434.

Forging of wheels from 46-lb. slugs. Slugs are heated in an oil-fired furnace and forged in two operations. Photographs. (F22)

172-F. (Norwegian.) Metallurgical Viewpoints on the Production of Copper Tubing. Olav Jore. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 15, no. 4, 1955, p. 60-70.

Consideration of hydrogen, oxygen and sulfur contents in the melting and casting of copper; methods and equipment for extruding and rolling copper tubing; effect of cold drawing on structure. Diagrams, graphs, photographs, micrographs. 14 ref. (F26, E25, Cu)

173-F. (Polish.) Hammers and Presses for Drop or Press Forging Heavy Pieces. Wieslaw Wroblewski. *Hutnik,* v. 22, no. 4, Apr. 1955, p. 127-130.

Characteristic design features, advantages, disadvantages and dimensions of the largest present-day drop-forging hammers and presses. Table, diagrams, photograph. 9 ref. (F22)

174-F. (Polish.) Trials to Adapt Metal Flow Formulas to the Roll Pass Design. Z. Wusatowski and R. Wusatowski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 115-123.

Formula, applicable to alloyed steels, and under varying rolling conditions, made possible by introducing correction coefficients. Modifications of the formula are derived for calculating irregular sections. Diagrams, nomograms. 11 ref. (F23, AY)

175-F. Detroit Steel Corporation's Multiple-Fueled Soaking Pits. F. C. McGough. *Iron and Steel Engineer,* v. 32, July 1955, p. 55-61; disc., p. 61-64.

Practicality of firing circular-type pits with low calorific mixed gas and preheated combustion air with burners which can also handle richer gases. No adverse effects were noticed on mill operations and definite savings were accomplished from the use of blast furnace gas. Photographs, diagrams. (F21)

176-F. Performance Factors Affecting Bar Mill Cooling Bed Arrangement. E. C. Peterson. *Iron and Steel Engineer,* v. 32, July 1955, p. 65-74.

Most common factors are ability of the bed to discharge bars from the mill runout table as well as to cool the mill production and ability of the cold bar shear to dispose of the cooled bars. Photographs, graphs, tables. (F23)

177-F. Continuous Drawing of Cold Finished Bars. Walter J. Prochak. *Iron and Steel Engineer,* v. 32, July 1955, p. 95-98.

Continuous operation reduces handling, increases yield, lessens maintenance, practically eliminates hazards and reduces operating crew by about 40%. Photographs. (F27, ST)

178-F. Two Decades of Progress in Drop Forging. H. J. Merchant. *Metal Treatment and Drop Forging,* v. 22, June 1955, p. 251-254.

Progress made in materials, methods of manufacture and utilization of forging dies and tools during the past 20 yr. Photographs. 7 ref. (F22, AY)

179-F. Impacting Makes Western Debut at Hycon. Harry A. Kirkpatrick. *Western Metals,* v. 13, July 1955, p. 46-48.

"Impacting", a relatively new forging process which permits "drop forging" in mid-air. This method requires less energy, compared with other forging processes, and works stock equally from two opposing sides. Photographs. (F22, Al)

180-F. Mechanical Working of Beryllium by Extrusion. P. Loewenstein, A. R. Kaufmann and S. V. Arnold. Paper from "The Metal Beryllium". American Society for Metals, p. 241-261.

Present day techniques, study of variables, special problems of powder and bare extrusion. Diagrams, X-rays, graphs, photographs. 5 ref. (F24, Be)

181-F. Mechanical Working of Beryllium by Rolling, Forging and Similar Processes. Shields M. Bishop. Paper from "The Metal Beryllium". American Society for Metals, p. 262-272.

Rolling of metal fabricated by various methods, forging and hot

coining and swaging. Photographs, graph. 28 ref. (F22, F23, F25, Be)

182-F. The Control of Quality in the Hot and Cold Rolling of Aluminium and Aluminium Alloys. F. King and A. N. Turner. Paper from "The Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. Pt. II. The Control of Quality in Working Operations". Institute of Metals Monograph and Report Series No. 16, p. 15-30 + 1 plate.

Theoretical and practical implications of the control of the tensile strength, bending and pressing properties, corrosion-resistance and surface finish of aluminum alloy sheet and strip. Effect of fabricating process on properties. Graphs, photograph, table, micrographs. 10 ref. (F23, Al)

183-F. The Control of Properties and Structure in the Hot and Cold Rolling of Copper and Copper-Base Alloys. W. W. Kee. Paper from "The Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. Pt. II. The Control of Quality in Working Operations". Institute of Metals Monograph and Report Series No. 16, p. 31-46 + 1 plate.

Methods of controlling grain-size, directionality, shape, gage and surface quality; influence of impurities on processing and structure. Graphs, photograph, tables, micrographs. 24 ref. (F23, Cu)

184-F. Some Factors Affecting the Quality of Extrusions. Christopher Smith and Norman Swindells. Paper from "The Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. Pt. II. The Control of Quality in Working Operations". Institute of Metals Monograph and Report Series No. 16, p. 47-57.

The practice of extrusion discussed in light of its effects on the quality of copper and aluminum alloy products made by this process. Tables. 7 ref. (F24, Al, Cu)

185-F. (French.) Forged and Stamped Parts of Aluminum Alloys. IV. Robert Colomb. *Revue de l'aluminium*, v. 32, no. 221, May 1955, p. 497-507.

Obtaining of rounded angles, shape and depth of marks, fibering, asymetrical pieces, protrusions and marking of pieces. Diagrams, tables. (To be continued.) (F22, G3, Al)

186-F. Manufacture and Properties of Large Forgings. II. Adolph O. Schaefer. *Industrial Heating*, v. 22, July 1955, p. 1394 + 6 pages.

Cycle for heating a 116-in. ingot to forging temperatures and subsequent heat treating cycles. Photographs, tables, diagrams. (F22, J general, ST)

187-F. Integrated Fastener Setup Shortens Delivery Time. E. C. Beaudet. *Iron Age*, v. 176, Aug. 11, 1955, p. 92-94.

Ferrous and nonferrous billets are cast from induction furnaces, extruded into bar, rod and wire on a 1650-ton press, and extrusions are then drawn to size for fastener production. Photographs, micrographs. (F24, F27, T7)

188-F. Can Controlled Temperature Rolling Improve Drawability. N. P. Goss. *Iron Age*, v. 178, Aug. 11, 1955, p. 100-102.

Process rolls sheet at 500° F. and produces a random orientation. Transverse and longitudinal properties are more compatible and improved "drawability" is the results. Diagrams, diffraction patterns. (F23, G4, SS)

189-F. Induction Heating. M. C. D. Hobbs. *Iron & Steel*, v. 28, June 1955, p. 315-316, 318.

Advantages and applications of induction heating of ingots in preparation for the billet mill. Photographs. (F21, J2, ST)

190-F. Drawing Failures in Extruded Shells. Hubert J. Pessl. *Metal Progress*, v. 68, Aug. 1, 1955, p. 80-81.

Cause of a steadily increasing rate of drawing failures of cold extruded 75-mm. shells could not be found until the punch broke. Failure was due to fatigue originating at a "flake". Stresses in drawing had caused the punch to increase in diameter and pinch the shells. Photographs. (F24, S21, TS)

G
Secondary Mechanical Working

210-G. Radial Draw-Forming. *Aircraft Production*, v. 17, July 1955, p. 255-261.

Compression-control of material during the forming process; cold forming of titanium-alloys. Description of equipment and operating procedures. Photographs, diagrams. (G9, Ti)

211-G. Control Data. R. H. Booth. *Aircraft Production*, v. 17, July 1955, p. 262-267.

Function of the electronic computer in machine-tool and production-process control. Diagrams, circuit diagram, graph, photographs. (G17)

212-G. Machining Titanium. II. Investigations Into the Effects of Coolant and Hardening Properties When Machining Ti-150A. J. T. D. Holt and J. Purcell. *Aircraft Production*, v. 17, July 1955, p. 279-281.

Tool life, cutting fluids, inflammability of swarf. Photographs, graphs, table, diagrams. (G17, G21, Ti)

213-G. Hydraulic Spinning. *Aircraft Production*, v. 17, July 1955, p. 282-286.

Forming process for the production of tubular and conical parts and rings of profiled cross section. Photographs, diagrams. (G13)

214-G. Tangential Stretch-Forming. *Aircraft Production*, v. 17, July 1955, p. 290-292.

Details of the Müller press with counter-drawing attachment for local re-drawing operations. Photographs, diagram. (G9)

215-G. Metal Gathering: What It Is and How It Works. W. E. Achor. *Iron Age*, v. 176, July 14, 1955, p. 99-102.

This process accumulates plastic metal under pressure at the ends or in the middle of tubing or bar stock. Increased strength, good grain flow and uniform metallurgical properties are obtained. Savings in handling, reduction in weight, elimination of machining are often possible. Diagrams, photographs. (G general)

216-G. Cold Power Spinning Will Save Material and Cut Costs. Kenneth W. Stalker and K. W. Moore. *Metalworking Production*, v. 99, July 1, 1955, p. 1173-1178.

Equipment and methods for high-pressure, cold plastic deformation of metals to form hollow cones and cylinders from simple flat blanks or pre-formed shapes which can reduce cost of making some parts as much as 75% while boosting strength 15% or more. Photographs, diagrams. (G13)

217-G. Using Punched-Card Equipment for Automatic Machine Tool Control. Alan H. Stillman. *Product Engineering*, v. 26, June 1955, p. 172-176.

Description of computers and converters. Calculations for noncircular gears produced by automatic gear-cutting control. Photographs, diagrams. 2 ref. (G17)

218-G. Beading Techniques for Strengthening Sheet Metal Parts. Bernhard Rogge. *Product Engineering*, v. 26, July 1955, p. 183-188.

Design criteria and specifications for sheet, angle, tube and assembly beading in steel, aluminum, magnesium, and other common materials. Diagrams, tables. (G11, Al, Mg, St)

219-G. Production Machining of Tools and Dies by Electrical Discharge. Richard Stoke. *Tooling and Production*, v. 21, July 1955, p. 51-53.

Drilling, grinding, tapping, boring and shaping the higher alloyed metals and metals of greater hardness and density are now being done by electrical discharge machining within any desired tolerance. Tables, photographs. (G17)

220-G. Special Lathe at the National Physical Laboratory for Cutting and Forming Fine-Pitch Screw Threads. V. W. Stanley. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 329-344; disc., p. 344-345.

A high-precision lathe capable of producing fine-pitch screws ranging from about 100 to 30,000 threads per in. Diagrams, photographs, graph. 3 ref. (G17)

221-G. Gear Shaving. A. Sykes. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 359-377; disc., p. 404-413.

Cutters and cutting processes; inspection methods. Photographs, diagrams. (G17, S14)

222-G. The Practical Approach to Engineering Fine Surfaces. D. B. Ebsworth. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 629-651; disc., p. 651-664.

Principles, equipment and methods of honing and lapping. Diagrams, graphs, photographs, table. (G19)

223-G. (Russian.) Machining of Non-Rigid (Hollow) Shaft. G. S. Beliaev. *Vestnik Mashinostroeniia*, v. 35, no. 6, June 1955, p. 41-44.

Operation; adjustment of shafts on lathes, optimum machining conditions. Tables, diagrams. (G17)

224-G. How to Machine Uranium. Alexander Denst and H. V. Ross. *American Machinist*, v. 99 Aug. 1, 1955, p. 95-97.

Methods developed by AEC. Photographs. (G17, U)

225-G. Gears Untouched by Human Hands. George H. De Groat. *American Machinist*, v. 99, Aug. 1, 1955, p. 111-120.

Automatic loaders and conveyors, tools, inspection and sorting in production of pinion gears. Diagrams, photographs. (G17)

226-G. Fatigue Strength of Flame-Cut Specimens in Black Mild Steel. F. Koenigsberger and H. W. Green. *British Welding Journal*, v. 2, July 1955, p. 313-321.

Shows that the heating effect of the cutting process has no greater influence on the fatigue resistance than the presence of the scale in-

herently present on mild steel. Table, diagrams, graphs, photographs, micrographs. 4 ref. (G22, Q7, CN)

227-G. Tracer Lathe Saves Setup and Machining Time. Herbert Chase. *Iron Age,* v. 176, July 28, 1955, p. 66-67.

Automatic operations in machining precombustion chambers for diesel engines. Photograph, diagram. (G17)

228-G. How to Control Perishable Tools. George Pascoe. *Machinery,* v. 61, Aug. 1955, p. 139-148.

Practices of the Ford Motor Co. in tool specifications, procurement, inspection, grinding, testing, use and salvage. Photographs, diagram, tables. (G17)

229-G. High-Pressure Forming on Verson-Wheelon Presses. O. E. Wheelon. *Machinery,* v. 61, Aug. 1955, p. 149-155.

Recent developments in the forming of steel sheets with an inflated rubber bag. Photographs, diagrams. (G8, CN)

230-G. Control Tape Prepared From Numerical Data. Edgar L. McFerren. *Machinery,* v. 61, Aug. 1955, p. 178-182.

Magnetic tape prepared electronically directly from numerical data is being used to automatically control a Giddings & Lewis spar and skin-milling machine. Cams or templates are not required, less skilled machine operators can be employed, and tapes can be stored for future production needs. Photographs. (G17)

231-G. Press Tool Devices for Continuous Production From Strip. *Mechanical World and Engineering Record,* v. 135, July 1955, p. 298-301.

Design and application of various types of stops for blanking dies. Diagrams. (G2)

232-G. Fabricating Titanium Sheet. *Metal Industry,* v. 87, July 15, 1955, p. 43-45.

Proposes method to make the most satisfactory parts from commercially pure sheet, using standard machines and processes, and comparing the techniques with those used in fabricating stainless steel parts. Photographs. (G general, Ti)

233-G. Indentation Pressure of a Smooth Circular Punch. E. Levin. *Quarterly of Applied Mathematics,* v. 13, July 1955, p. 133-137.

Technique used to obtain an upper bound on the punch pressure at the moment of impending plastic indentation. Diagrams, tables. 4 ref. (G2, Q24)

234-G. The Fundamentals of Progressive Tooling. J. A. Grainger. *Sheet Metal Industries,* v. 32, no. 339, July 1955, p. 485-489.

Design of press tools of the follow-on or cut-and-carry types which permit uninterrupted feeding of the stock across the die face. Photographs, diagrams. (G1)

235-G. Putting Machinability Data to Work. M. C. Shaw, N. H. Cook and P. A. Smith. *Tool Engineer,* v. 35, Aug. 1955, p. 81-86.

Applications to tool wear rate, finish obtained and machining costs. Photographs, diagrams, graphs. 2 ref. (G17)

236-G. Heavy-Duty Machining. A. B. Albrecht. *Western Machinery and Steel World,* v. 46, July 1955, p. 74-77.

Use of chip studies, tool forces and horsepower values in selecting proper cutting speeds. Photographs, tables, graphs. (G17)

237-G. Some Bending Characteristics of Cartridge Brass, 70%, and Yellow Brass, 65%, Wire. Lewis E. Thelin and Robert O. Abbott, Jr. *Wire and Wire Products,* v. 30, July 1955, p. 763-766, 813-814.

Data presented in form of value to both metallurgists and tool designers in selection of suitable temper wire for formed parts and possibly will give an indication of the "spring-back", or set for use, when designing bending dies. Photographs, tables. (G6, Cu)

238-G. Machining of Beryllium. Leslie E. Duran. Paper from "The Metal Beryllium". American Society for Metals, p. 273-282.

Machining by turning, milling, drilling, reaming, grinding, sawing, in addition to cutting tools, feeds, and speeds, and comparisons made with more common metals exhibiting similar machining characteristics. Table, diagrams, photographs. 3 ref. (G17, Be)

239-G. (French.) Machining by Electric Spark. D. W. Rudorff. *Métallurgie et la construction mécanique,* v. 87, no. 6, June 1955, p. 489 + 5 pages.

Fundamental principles, conditions for operation, equipment. Diagrams, photographs. 3 ref. (G17)

240-G. (German.) Investigation of the Cutting Properties of WC-TiC-Co Alloys. H. J. Booss. *Metall,* v. 9, nos. 13-14, July 1955, p. 560-564.

Preparation and analysis of hard metals; influence and composition of free carbon and cobalt content on cutting properties. Tables, graphs. 23 ref. (G17, W, Ti, Co)

241-G. Modern Stainless Steels. *Edgar Allen News,* v. 34, July 1955, p. 157-158.

Methods of drilling, tapping, sawing and milling. Photographs. (To be continued.) (G17, SS)

242-G. The Grinding of Steel. XXV. Grinding and Finishing Machines. *Edgar Allen News,* v. 34, July 1955, p. 159-160.

Description and capabilities of roll grinding, universal and other grinding machines. Photograph, graph. (To be continued.) (G18)

243-G. How to Work Arc-Cast Molybdenum. *Iron Age,* v. 176, Aug. 11, 1955, p. 95-97.

High speed steel and tungsten carbide tools have given good results in machining; in drawing and spinning, both metal and tools should be heated; satisfactory welds are obtained using arc, electrical resistance, percussion and flash welding; special care needed in grinding. Photographs.
(G general, K1, K3, Mo)

H
Powder Metallurgy

144-H. Small Volume Production of Metal Powder Parts. B. I. Horton. *Materials & Methods,* v. 42, July 1955, p. 92-93.

Type of parts produced and the savings that have resulted from using powder metal parts. Photographs. (H general)

145-H. High Strength Steel Parts by New Powder Metallurgy Process. John W. Young. *Metal Progress,* v. 68, July 1955, p. 110-113.

Manufacture of steel parts from metal powders with high density and a combination of hardness, strength and ductility approaching that of wrought material of the same alloy and carbon content. Graphs, diagrams, micrographs. (H general, ST)

146-H. (German.) Rosin-Rammler's Distribution of Grain Size in Ground Powders. R. Brenner and A. Vidmajer. *Metall,* v. 9, no. 9-10, May 1955, p. 396-403.

Determination of distribution maxima from experimentally determined distribution and grain-size parameters. Graphs. 4 ref. (H11)

147-H. (Polish.) Investigations of Metal Powder Production. W. Rutkowski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 141-147.

Electrolytic and chemical methods of preparing iron, copper, tin, cobalt and nickel powders. Analysis of physical and chemical properties to determine suitability for producing articles. Tables, graphs, micrographs, diagram. 19 ref.
(H10, H11, Fe, Cu, Sn, Co, Ni)

148-H. Properties and Uses of Sintered Aluminium. R. Irmann. *Metal Treatment and Drop Forging,* v. 22, June 1955, p. 245-250.

Properties and potentialities of sintered aluminum powder, possible uses. Micrographs, graphs, tables, photographs, diagrams. 22 ref.
(H general, Al)

149-H. Fabrication of Beryllium by Powder Metallurgy. Wallace W. Beaver. Paper from "The Metal Beryllium". American Society for Metals, p. 152-201.

Production, consolidation and fabrication of powders and properties of resulting products. Graphs, diagrams, tables, micrographs, photographs. 20 ref. (H general, Be)

150-H. Research and Development in Beryllium Powder Metallurgy. Henry H. Hausner and Norman P. Pinto. Paper from "The Metal Beryllium". American Society for Metals, p. 202-240.

Theory, room temperature compacting, mechanical and thermal treatment of compacts, cold press sintering and pressing at elevated temperatures. Graphs, tables, micrographs. 19 ref. (H general, Be)

151-H. Refractory Compounds and Cermets of Beryllium. Wallace W. Beaver. Paper from "The Metal Beryllium". American Society for Metals, p. 570-598.

Preparation, fabrication and properties of oxides, carbides and nitrides of beryllium. Methods of preparing cermets containing oxides, carbides and nitrides, intermetallic compounds, comparison of refractory compounds and cermets of beryllium. Tables, photograph, graph, micrographs. 52 ref.
(H general, Be)

152-H. (English.) On the Phenomenological Theory of the Fine Exfoliating Disintegration. Muneyuki Date. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 2, Apr. 1955, p. 210-228.

Phenomenological calculation of the distribution function of numerous particles which are in the process of fine exfoliating disintegration. Graphs, tables, diagrams. 10 ref. (H10)

153-H. (German.) Change in Dimension of Iron-Copper Sintered Alloys. E. Pelzel. *Metall,* v. 9, nos. 13-14, July 1955, p. 565-569.

Possible causes of shrinkage and growth, selection of iron powder and copper or copper alloy powder, weight losses and shrinkage, mechanical properties of finished products. Tables, graphs, micrograph. 15 ref. (H15, Cu, Fe)

154-H. Some Studies of Al-Cu and Al-Zr Solid State Bonding. Samuel Storchheim. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Aug. 1955, p. 891-894.

Studied as a function of temperature, pressure and time at pres-

sure, it is shown that good bonds were obtainable with copper, while excellent bonds were attained with zirconium. With this system, it is possible to develop bond strengths between the two metals which are greater than aluminum itself. Diagram, graphs, micrographs, photographs. 1 ref. (H14, N1, Al, Cu, Zr)

155-H. Production of Zirconium Diboride From Zirconia and Boron Carbide. Charles T. Baroch and T. E. Evans. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Aug. 1955, p. 908-911.

Techniques of production, design of graphite resistance furnace. Diagrams, tables. 13 ref. (H10)

156-H. Applications of Powder Metallurgy. *Metal Progress,* v. 68, Aug. 1, 1955, p. 97-99.

Highlights from five papers presented at the Western Metal Congress in March 1955. Application of carbides, sintered aluminum powder, structural components, high-temperature brazing. (H general)

157-H. New Presses for Metal-Powder Products. S. L. Zlotnikov and L. G. Brodskii. *Henry Brutcher Translation No.* 3451, 9 p. (From *Vestnik Mashinostroeniya,* v. 34, no. 7, 1954, p. 18-22.) Henry Brutcher, Altadena, Calif.

Three types of automatic press for compacting metal powders and buffering systems to control compacting pressure and prevent overloading of presses owing to variations in the nature of the material being pressed. Table, diagrams, graphs, photographs. (H14)

J Heat Treatment

159-J. Propeller-Agitated Quenching. *American Machinist,* v. 99, July 18, 1955, p. 155, 157, 159; Aug. 1, 1955, p. 129, 131.

Effectiveness of and general rules for cooling the quench baths; number of agitating units required. Table, graphs, photographs, diagrams. (To be continued). (J26)

160-J. Simplify Approach to Titanium Heat Treatment. P. D. Frost. *Iron Age,* v. 175, June 30, 1955, p. 65-68.

Analysis of the metallurgy of titanium alloys permits the fabricator to make better use of them and to understand their behavior and their susceptibility to "omega" embrittlement in hot forming and heat treating. Diagram, graphs, micrographs. 1 ref. (J general, Ti)

161-J. Improve Cast Aluminum Alloys by Heat Treatment. B. L. Meredith. *Materials & Methods,* v. 42, July 1955, p. 108-110.

Use of solution and aging treatments to obtain better mechanical properties, stress-relief to maintain dimensional accuracy, and stabilizing to obtain low stress level. Photographs, graph. 1 ref. (J27, J29, Q general, Al)

162-J. Europe's Largest Furnace for Continuous Gas Carburizing. T. E. W. Preston. *Metalworking Production,* v. 99, July 8, 1955, p. 1205-1212.

Design, construction and operation of a furnace which uses the enriched carrier gas technique for supplying carbon to work to be case hardened; butane, cracked on the work, gives the free carbon; temperature control of the order of ±5° F. achieved. Photographs, diagrams. (J28)

163-J. The Metallographic View. XII. Hardenability, Its Meaning. H. E. Boyer. *Steel Processing,* v. 41, July 1955, p. 432.

Definition of the term hardenability, factors which effect it in the heat treatment of steels. Diagram. (J26, ST)

164-J. High Powered Induction Heating in Shell Forging. H. J. Landsman and A. T. Lattauzeo. *Steel Processing,* v. 41, July 1955, p. 453-457.

Installation for heating the nose end of 8-in. and 155-mm. artillery shells prior to forging the nose. Photographs, diagrams. (J2, F21)

165-J. Hardening by Induction. Fred Spencer. *Tooling and Production,* v. 21, July 1955, p. 55-58, 66, 72.

Applications, advantages and limitations of the method. Diagram, table, photographs. 5 ref. (J2, ST)

166-J. (Hungarian.) **Martensite Tempering of Tool Steels.** Odön Szabo. *Kohaszati Lapok,* v. 10, no. 6, June 1955, p. 262-272.

Experiments for evolving method of toolsteel tempering in a salt bath for decreasing rejects caused by deformation and quenching cracks. Tables, graphs, diagram, micrographs. (J26, TS)

167-J. (Hungarian.) **Induction Heating of Aluminum Cores.** Laszlo Zelenka. *Kohaszati Lapok,* v. 10, no. 6, June 1955, p. 275-278.

Theoretical considerations, applicability and effectiveness of process. Diagrams, graphs, tables. 8 ref. (J2, Al)

168-J. Carbon Restoration Annealing for Uniformity of Bar Stock Structure. H. W. Callahan. *Industrial Heating,* v. 22, July 1955, p. 1412 + 5 pages.

Summary of the principal heat treatment carried out in a batch controlled atmosphere furnace, types of steels, range of stock sizes processed. Photographs, micrographs, diagrams. (J23)

169-J. Gas Purge for Consistent Carburizing Quality. P. M. Unterweiser. *Iron Age,* v. 176, July 28, 1955, p. 72-74.

Furnace purging with cracked city gas does not soot electrical resistance control elements. Photograph, graph, micrographs. (J28)

170-J. Fast Heating Is Practical and Safe. H. G. Grim. *Steel,* v. 137, July 18, 1955, p. 104-105.

Heating 20-ton work loads of die blocks for hardening in a cycle of 3 to 4 hr. Photographs, graph. (J26, ST)

171-J. Hardenability of Carbo-Nitrided Carbon Steel. R. H. Marshall. *Metal Progress,* v. 68, Aug. 1, 1955, p. 91-93.

Increase in grain size or manganese content increases hardenability of carbo-nitrided carbon steels. Effect of grain size is greater than the effect of manganese in the range investigated. Tables, graphs. (J26, ST)

172-J. 4000° F. Gas Furnace. Horace B. Drever. *Metal Progress,* v. 68, Aug. 1, 1955, p. 94-95.

A completely automatic gas-fired furnace developed in England is capable of continued operation in the range of 3200 to 4000° F., using air rather than oxygen for combustion. Photographs. (J general)

173-J. Hardenability Bands for Tentative Standard H-Steels, Boron-Treated. *Metal Progress,* v. 68, Aug. 1, 1955, p. 104B.

Hardenability curves and data issued by the American Iron and Steel Institute. Graphs. (J26, AY)

174-J. Heat Treating Stainless Steels. I-II. W. E. McFee. *Steel,* v. 137, Aug. 8, 1955, p. 70-72; Aug. 15, 1955, p. 158-160, 162.

Precautions and details in annealing and hardening martensitic-chromium and PH types. Graphs, tables, photographs. (J23, J26, SS)

175-J. (French.) **A Case of Heat Treating Cast Irons: Annealing Treatment.** Gabrielle Aubrion. *Fonderie,* 1955, no. 113, June, p. 4563-4572.

Different types of annealing treatment, practical examples. Micrographs, photograph, diagram. Graphs. (J23, CI)

176-J. (French.) **Heat Treatments for Cast Steels.** *Fonderie,* 1955, no. 113, June, p. 4573-4575.

Annealing of unalloyed steels, quenching and tempering methods. Tables, micrographs. (J23, J26, J29, CI)

177-J. (German.) **A New Investigation of the Problem of Hardening.** Werner Köster. Paper from "L'état solide". Institut International de Physique Solvay, p. 235-261; disc., p. 262-271.

Kinetic measurements for determination of the relationship between cold and hot hardening of aluminum-silver alloys, influence of quenching stress on the kinetics of hardening, residual stresses during hardening. Tables, graphs, diagrams. 41 ref. (J26, J27, Q25, Al, Ag)

178-J. (Russian.) **Study of the Temperature of the Spark From the Apparatus for Electro-Spark Hardening of Metals.** A. N. Liulichev and L. S. Palatnik. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 19, no. 1, Jan.-Feb. 1955, p. 66-67 + 1 plate.

Relation between electrode diameter and spark temperature; effect of condenser capacity; spectroscopic analysis of spark. Spectrographs. 5 ref. (J28)

K Joining

315-K. Report of Committee D-11 on Rubber and Rubber-Like Materials. *American Society for Testing Materials, Preprint No.* 44, 1955, 18 p.

Tentative specifications for ozone resistant rubber insulating tape; proposed revision of tentative test methods for adhesion of vulcanized rubber to metal and of testing hard rubber products. Table, diagrams, photographs. (K12)

316-K. Some Interesting Welding Investigations. I. W. P. Campbell and M. J. Nolan. *Canadian Metals,* v. 18, July 1955, p. 42-45.

Show result of failure to observe some detail of welding procedure or technique, or possibly, a misapplication of welding. Photographs, micrographs. (To be continued.) (K9)

317-K. Review of High Temperature Metal-Ceramic Seals. Hayne Palmour, III. *Electrochemical Society, Journal,* v. 102, July 1955, p. 160C-164C.

Technical review of the development of metal-ceramic seals with emphasis on methods devised for high temperature brazing of metals to low-loss technical ceramics for electronic applications. Photographs, diagrams, tables, graphs. 13 ref. (K11)

318-K. Pressure Welding Gives Stronger Titanium Joints. A. P. Lage and S. S. Smith. *Iron Age,* v. 176, July 14, 1955, p. 103-105.

Provides a reliable method of fabricating 3% Al, 5% Cr titanium al-

loy and produces a forged butt weld of superior strength by upsetting the faying surfaces under heat and pressure. Photographs, micrographs, table. (K2, Ti)

319-K. Weldability of Cast Steels. Helmut Thielsch. *Machine Design,* v. 27, July 1955, p. 167-171.

Design recommendations for welding procedures, electrode specifications and heat-treatment methods for cast carbon and low alloy steels. Table, photographs. (K9, CI)

320-K. Effect of Silicon in Submerged Arc Welds. W. Simon. *Materials & Methods,* v. 42, July 1955, p. 132-134.

Investigation to determine the effect of silicon content on brittleness of weld joints. Graphs, tables. 3 ref. (K1)

321-K. Adhesive Bonded Metal Joints. R. T. Schwartz and R. E. Wittman. *Product Engineering,* v. 26, July 1955, p. 170-173

Measurements of room-temperature shear strength on lap joints show that rates of loading from static to impact speeds have no effect on strength. Eight different adhesives evaluated, ranging from rigid resin-type to less rigid rubber-resin plastic compounds. Tables, diagram, graphs. (K12)

322-K. Some Current Aspects of Industrial Brazing. John E. Hyler. *Steel Processing,* v. 41, July 1955, p. 426-431, 458.

Fluxes and brazing alloys, flow temperatures, electrical resistance, brazing, flame-fluxing method, and aspects of furnace brazing. Photographs. (K8, Ag)

323-K. (German.) Arc Welding of Aluminum Under the Protection of Inert Gases. W. Mantel and L. Wolff. *Aluminium,* v. 31, no. 6, June 1955, p. 255-259.

"Argonarc" and "sigma" welding. Description, optimum conditions, economy of the method. Graphs, micrographs. 4 ref. (K1, Al)

324-K. (German.) A New Method of Flash-Butt Welding of Aluminum Alloys. A. Klopfert. *Aluminium,* v. 31, no. 6, June 1955, p. 260-266.

The method, with special reference to its effects on the design and properties of the manufactured components. Diagrams, photographs, tables. 1 ref. (K3, Al)

325-K. (German.) Application of Modern Welding Techniques in Construction of Hoisting Equipment Made of Aluminum Alloy. J. Weisgerber and Puschner. *Aluminium,* v. 31, no. 6, June 1955, p. 266-270.

Structural design of the welded joint; method of arc welding; composition of the alloy. Photographs, diagrams, micrographs. 1 ref. (K1, Al)

326-K. (German.) Hatch Beams of Aluminum-Alloys. (AlMgSi). A. Szymanski. *Aluminium,* v. 31, no. 6, June 1955, p. 271-274.

Machine arc welding of aluminum-magnesium-silicon alloy. Welding joints, method and machine used. Diagrams, photographs, graphs, table. 3 ref. (K1, Al)

327-K. (German.) Investigation of Adhesive Bonding of Metals. G. Kaliske. *Aluminium,* v. 31, no. 6, June 1955, p. 275-281.

Survey of present status. Influence of a series of factors, such as thickness of joined parts, method of joining and material, on the strength of the bonded joint. Adhesive materials. Graphs, photographs. 20 ref. (K12)

328-K. (German.) The Application of Welding in Modern Steel Building, Bridge Construction, and Rail Joining. Otto Steinhardt. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 236-241.

Influence of welding on constructional development, typical elements of design for welding, examples of modern realizations of weld-fit designs; continuous rail welding. Photographs, graphs, diagrams. (K general, T26, ST)

329-K. (German.) The Application of Welding in Shipbuilding. J. Hansen. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 241-246.

Development of welding in ships, assembly of prefabricated parts, characteristic details of welded design, influence of vibrations on welded ships, failures and their consequences. Photograph, diagrams. (K general)

330-K. (German.) The Application of Welding in Modern Motor Car Fabrication. Otto Gengenbach. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 251-256.

Welding processes, especially spot welding, constructional development of motor cars, manufacture of car bodies and electrical sets of welding machines. Photographs, diagrams. (K general)

331-K. (German.) The Application of Welding in the Construction of Containers and Pipings and in Pipe Manufacture. W. Rädeker. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 257-261.

Materials, bending procedure, welding methods and finishing. Photographs, graph, diagram. (K general)

332-K. (German.) The Application of Welding in Modern Boiler and Pressure Vessel Design and Manufacture. R. Quack. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 262-264.

Welding of boiler drums, pipes, collectors and pressure vessels. Photographs, diagrams. (K general)

333-K. (German.) The Application of Welding in Machine Construction With Special Reference to Rigidity, Tension, and Straining of Material. F. W. Griese. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 265-270.

Relations between working conditions, design and material from the designer's point of view. Diagrams. (K general)

334-K. (German.) Welding as a Problem of Materials—On the Brittle Fracture of Steel. A. Matting. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 270-274.

Conditions for brittle fracture, present testing methods, proposal for a new testing method. Photographs, diagrams. 13 ref. (K general, Q26, ST)

335-K. (German.) Advantages of Welding for Design and Production. C. Stieler. *Schweissen und Schneiden,* v. 7, no. 6, June 1955, p. 274-279.

Review of the improvements by welding, welding and casting and welding and riveting. Photographs, graph, diagrams. (K general)

336-K. (Spanish.). Automatic Arc Welding. Evert H. Bylin. *Ciencia y técnica de la Soldadura,* v. 5, no. 23, Mar.-Apr. 1955, 6 p.

Study of the problem of continuity of coated electrodes in automatic arc welding. Diagrams, photographs. (K1)

337-K. (Spanish.) Problem of Weldability in Resistance Welding. C. Penche Felgueroso. *Ciencia y técnica de la Soldadura,* v. 5, no. 23, Mar.-Apr. 1955, 10 p.

Study of transformations taking place in difficult weldable materials during electric resistance welding according to different processes. Graphs, diagrams, micrographs. 7 ref. (K3, K9, N general)

338-K. (Spanish.) Spot Welding of High-Strength Steels. Method for Determining the Regulation of Resistance Welding Machines. Presentation of a Regulation Diagram. P. Joumat. *Ciencia y técnica de la Soldadura,* v. 5, no. 23, Mar.-Apr. 1955, 4 p.

Principle of spot welding method; use of regulation diagram. (K3, AY)

339-K. The Composition of Weld Metal. W. P. van den Blink. *British Welding Journal,* v. 2, July 1955, p. 285-290; disc., p. 291-292.

Influence of metallurgical factors, especially in mild steel electrodes; effect of composition on properties and operative characteristics. Tables, graphs, photograph. 30 ref. (K1, CN)

340-K. The Economic Proportion of Welding in Shipbuilding. W. R. Mellanby. *British Welding Journal,* v. 2, July 1955, p. 299-304.

Concludes that the most economic design for a cargo vessel is one with an all-welded double bottom, as well as both decks, and with welded shell butts and seams; however, if large sections cannot be prepared at ground level, riveting of the shell is preferred. Tables, graphs, diagrams. (K general)

341-K. A Method for Calculating the Effect of Preheat on Weldability. C. L. M. Cottrell and B. J. Bradstreet. *British Welding Journal,* v. 2, July 1955, p. 305-309.

An equation, derived by experiment, relates the cooling rate at 300° C. in the weld heat affected zone to the geometry of the joint, the size of the weld and the initial plate temperature and applies to metal-arc welds made on mild and low-alloy steels. Tables, graphs. 6 ref. (K9, CN)

342-K. Calculated Preheat Temperatures to Prevent Hard-Zone Cracking in Low-Alloy Steels. C. L. M. Cottrell and B. J. Bradstreet. *British Welding Journal,* v. 2, July 1955, p. 310-312.

Tables present preheat temperature required for the metal-arc welding of a low-alloy steel from the dimensions and form of the joint, the weld size and the weldability of the steel. Tables. 3 ref. (K1, K9, CN)

343-K. The Industrial Use of High-Energy Materials. C. H. Carlton, F. A. Warren and J. H. Wiegand. *Chemical Engineering Progress,* v. 51, July 1955, p. 335-338.

Applications of explosives in riveting, stud driving, metal forming, oil well perforating and other operations. Diagrams, graphs. 14 ref. (K13, G general)

344-K. Aluminium-Alloy Concave-Pointed Rivets. Small Loads Suffice for Closing. J. D. Haddon. *Engineering,* v. 180, July 15, 1955, p. 79-83.

Concave rivets, closed with a comparatively small squeeze load, may be successfully used in joints in which the rivet is chiefly subjected to shear if a small point length is provided to prevent the rivet from pulling out of its hole before it fails by shear. Diagrams, graphs, photographs, tables. 4 ref. (K13, Al)

345-K. Arc Welding for Small-Lot Production. III. Tooling the Job. Arthur H. Allen. *Tool Engineer,* v. 35, Aug. 1955, p. 89-93.

Design and use of jigs and fixtures, costs. Photographs, tables. (K1)

346-K. Fabrication of Water Turbine Components. F. Buckley. *Welding and Metal Fabrication,* v. 23, July 1955, p. 236-243.

Advantages and disadvantages of welding cast, rolled or forged forms

into water turbine components. Photographs. (K general)

347-K. The Economic Application of Automatic Arc Welding Equipment. J. A. Lucey. *Welding and Metal Fabrication,* v. 23, July 1955, p. 251-257.

Methods which must be employed to secure maximum economies with automatic welding. Graphs, photographs. (K1)

348-K. Automatic Control of Machine Arc Welding. F. Hirschmann. *Welding and Metal Fabrication,* v. 23, July 1955, p. 262-264.

Equipment for arc length control, which is nonelectronic, makes the welding torch follow the profile of the workpiece and also moves the torch towards the workpiece and away from it, at the start and end of the weld. Diagrams, photographs, graphs, tables. (K1)

349-K. Nomograph for Weight of Electrode Metal Required. Tyler G. Hicks. *Welding Engineer,* v. 40, Mid-June 1955, p. 27.

Chart for making quick estimates of the weight of electrode metal required for a given joint. Nomograph. (K1)

350-K. How to Figure Diameter or Length of Brazing Wire. *Welding Engineer,* v. 40, Mid-June 1955, p. 42A.

Guide for selecting proper alloy wire size for brazing tubular or linear joints of given specifications. Nomograph, diagrams. (K8)

351-K. Material Characteristics as Related to Resistance-Welding Current and Pressure. *Welding Engineer,* v. 40, Mid-June 1955, p. 47.

Nomograph relating relative hardness and electrical conductivity of various alloys to current and pressure. Nomograph. (K3)

352-K. Inert-Gas Welding in the Aircraft Industry. J. M. Thompson, Jr. *Welding Journal,* v. 34, July 1955, p. 635-640.

Several applications of inert-gas welding of aluminum, magnesium, titanium and stainless steel. Photographs. (K1, Al, Mg, SS, Ti)

353-K. Hand Welding 5-Chrome and 9-Chrome Pipe. W. J. Lester. *Welding Journal,* v. 34, July 1955, p. 641-647.

An alternative procedure which allows cooling from the preheat temperature to ambient conditions after a ½-hr. post-heat at 500° F., followed by stress relieving at a more convenient time. Photographs, diagrams, graphs, tables, micrographs. (K1, J1, Cr)

354-K. Inert-Gas-Shielded Tungsten-Arc Spot Welding. C. A. McClean. *Welding Journal,* v. 34, July 1955, p. 648-656.

Investigation of variables, recommended procedures, comparison with resistance spot welding and job applications. Photographs, diagrams, graphs. 5 ref. (K3, ST, SS)

355-K. Titanium Alloy Weldability and Correlated Metallurgy. H. L. Meredith and C. W. Handova. *Welding Journal,* v. 34, July 1955, p. 657-672.

Extensive tests indicate alpha and alpha-beta titanium alloys are readily weldable by the inert-gas tungsten-arc process. Photographs, graphs, micrographs, diagrams, tables. (K9, K1, Ti)

356-K. Joining of Beryllium. D. C. Martin. Paper from "The Metal Beryllium". American Society for Metals, p. 283-294.

Three methods, fusion, self welding and brazing, discussed as means of joining beryllium to itself and to other metals. The use of shielded arc, straight polarity, direct current and beryllium filler have yielded best results. Photographs, micrographs, diagrams, tables. 9 ref. (K1, K4, K8, Be)

357-K. (French.) **Development of the Use of Gas Flux in the Joining of Metals.** B. Liebesman. *Soudage et Techniques connexes,* v. 9, nos. 5-6, May-June 1955, p. 119-125; disc., p. 125-126.

Apparatus using gas flux incorporated in the flame for welding, brazing and solder-brazing, makes it possible to eliminate cleansing powders and coated rods. Photographs, diagrams, table. (K2, K7, K8)

358-K. (French.) **A Process for Killing the Melting Bath in the Welding of Steels.** A. Leroy, H. Granjon and M. Evrard. *Soudage et Techniques connexes,* v. 9, nos. 5-6, May-June 1955, p. 127-129; disc., p. 129-130.

Conditions for preventing reaction between carbon and iron oxide during welding of steel by use of killing additions and aluminum metallization of the edges to be welded. Micrographs. (K1, ST)

359-K. (French.) **Some Particular Applications of the Oxy-Acetylene Flame.** M. Evrard. *Soudage et Techniques connexes,* v. 9, nos. 5-6, May-June 1955, p. 141-146; disc. p. 146.

Structural modifications of oxy-acetylene welds in heavy gage aluminum; changes in stress states and surface states. Photographs, radiographs, diagram. 4 ref. (K2, Al)

360-K. (Russian.) **Automatic Submerged-Arc Welding of Steel Sheets in Lower Position.** F. F. Benua and A. I. Katler. *Svarochnoe Proizvodstvo,* 1955, no. 7, July, p. 1-4.

Flux used, welding conditions, including current strength at each electrode, and welding and feed rates. One-direction, one-pass operation worked out. Tables, photographs, diagram. 18 ref. (K1, ST)

361-K. (Russian.) **Effectively Weldable Cast Steel of High Strength.** I. P. Krianin. *Svarochnoe Proizvodstvo,* 1955, no. 7, July, p. 7-9.

Types of defects and the microstructure of welded joints and seams; effect of types of heat treatment for base metals and seams, and of alloying elements on strength and hardness. Micrographs, table, graphs, photographs. 8 ref. (K9, M27, J general, Q23, Q29, CI)

362-K. (Russian.) **Ceramic Fluxes for Automatic Arc Welding.** K. K. Khrenov and D. M. Kushnerev. *Svarochnoe Proizvodstvo,* 1955, no. 7, July, p. 13-16.

Effect of fluxes on strength, hardness and microstructure of base metal and surface. Micrographs, photographs, tables. 7 ref. (K1, M27, Q23, Q29, ST)

363-K. Submerged Arc Welding Fabricates a Light Weight Diesel Crankcase. Albert C. Drechsler. *Industry & Welding,* v. 28, Aug. 1955, p. 62-66.

Development of automatic welding fixture used in the fabrication of steel forgings and flame cut steel. Photographs, diagrams. (K1, ST)

364-K. Here's How to Use Projection Welding. *Industry & Welding,* v. 28, Aug. 1955, p. 76-78, 80.

Projection sizes and shapes, current and pressures, weldable metals, precautionary measures. Table, diagrams. (K3)

365-K. Use CO_2 Shielding Gas in Automatic Welding Mild Steels. R. W. Tuthill. *Industry & Welding,* v. 28, Aug. 1955, p. 46-48, 80-82.

Control and gas requirements, speed of wire feed, appearance of weld surface, electrode specifications. Photographs, diagram. (K1, ST)

366-K. Notes on the Role of Hydrogen in Metal Arc Welding. P. D. Blake. *Welder,* v. 24, Jan.-Mar. 1955, p. 14-20.

Review of literature on the deleterious effects of hydrogen upon weld metal. Photographs, diagram. 11 ref. (K1, K9, AY)

L Cleaning, Coating and Finishing

492-L. Effect of Oxygen Content of Furnace Atmosphere on Adherence of Vitreous Coatings to Iron. A. G. Eubanks and D. G. Moore. *American Ceramic Society, Journal,* v. 38, July 1955, p. 226-230.

Use of porcelain enamel ground coats, with varying amounts of cobalt oxide, showed that optimum adherence necessitated increasing the oxide if the oxygen were decreased. A qualitative correlation was found between adherence and surface roughness, regardless of the oxygen content of the firing atmosphere. Photograph, diagram, graphs, tables, micrographs. 22 ref. (L27, Fe)

493-L. Paint Faults and Remedies. II. Peeling. H. Courtney Bryson. *Corrosion Prevention and Control,* v. 2, June 1955, p. 27-31, 41.

Requisites for obtaining good adhesion include preparation of a clean surface, immediate application of paint, use of corrosion resistant primer and a good top coat. Photograph. (L26)

494-L. Developments in Preparatory Treatments. II. Chemical. *Corrosion Prevention and Control,* v. 2, June 1955, p. 37-39.

General methods and tests, oxide film effect, pickling studies, ultrasonic cleaning and specific treatment for aluminum and aluminum alloys. (To be continued.) (L12, L10, ST, Al)

495-L. Corrosion Prevention Practice. IV. Protecting a Tanker. *Corrosion Prevention and Control,* v. 2, June 1955, p. 40-41.

Use of Epikote resin based coating, cathodic protection and metal sprayed coating in tests for corrosion prevention in ballast tanks. Photograph. (L23, L26, R10)

496-L. A Method for the Isolation of Surface Films From Aluminum Alloys and the Mechanism of the Reactions Involved. M. J. Pryor and D. S. Keir. *Electrochemical Society, Journal,* v. 102, July 1955, p. 370-381.

Use of warm solutions of iodine in methanol for isolating surface films not containing copper. A mechanism for the dissolution of aluminum in iodine-methanol solutions is suggested. Tables, graphs, photographs. 29 ref. (L14, Al)

497-L. Brightening Agents for the Tin-II Sulfate-Sulfuric Acid Electrolyte. C. A. Discher and F. C. Mathers. *Electrochemical Society, Journal,* v. 102, July 1955, p. 387-389.

Concentration ranges of electrolyte and operating conditions, properties of the electrodeposit, role played by each of the addition agents. 6 ref. (L17, Sn)

498-L. Product Design for Organic Finishing. F. C. Ashford. *Electro-*

plating and Metal Finishing, v. 8, July 1955, p. 254-257.

Correlation of finishing scheme with form of the article, effects of component shape, color selection. Diagrams, photograph. 1 ref. (L26)

499-L. A Review of the Use of Molybdenum in Metal Spraying. Sheila M. Holgate. *Electroplating and Metal Finishing*, v. 8, July 1955, p. 258-262.

Properties and applications of sprayed molybdenum, spraying techniques, factors governing the adhesions of the coatings. 7 ref. (L23, Mo)

500-L. Blast Equipment Maintenance Can Save You Money. L. M. Johns. *Foundry*, v. 83, July 1955, p. 128-129.

Batch and continuous-type blast barrel cleaning used in foundry cleaning rooms. Photograph. (L10)

501-L. Plating Machine Design Leads to High Anodizing Rates. Paul Pearson. *Iron Age*, v. 175, June 30, 1955, p. 59-61.

With an anodizing setup, based on a return-type electroplating machine design, coating uniformity and quality are considerably superior, maintenance is negligible, and, being custom built, the system makes good use of floor space. Diagram, photographs. (L19, Al)

502-L. Metal Finishing: New Developments Shape Future Trends. J. J. Obrzut. *Iron Age*, v. 176, July 14, 1955, p. 106-107.

Recent developments in plating machinery, control instruments and chemicals and processes for use in plating and finishing. (L general)

503-L. Coatings; Good Structural Design Aids Battle Against Corrosion. C. G. Munger. *Iron Age*, v. 176, July 14, 1955, p. 108-111.

Angles, corners, welds, rivets and edges are major trouble spots in coating steel structures and, consequently, the coating material quality is not as important as is the design of the structure. Diagrams, photographs. (L general)

504-L. New Clad Metals Made by Vacuum Brazing. Kenneth Rose. *Materials & Methods*, v. 42, July 1955, p. 100-102 .

Metals and sizes, bonding method and properties of composites in new cladding process. Photographs. 3 ref. (L22)

505-L. Electrodeposition of Nickel From Fluoborate Solutions. C. B. F. Young and William Strobach. *Metal Finishing*, v. 53, July 1955, p. 44-50.

Investigates effect of bath composition and concentration, temperature, current density, pH, agitation and addition agents. Tests on ductility of deposits, their uniformity of thickness and ability to be buffed and to accept a chromium plate. Graphs, table. (To be continued.) (L17, Ni)

506-L. Bronze Plating: Why and How. Frederick A. Lowenheim. *Metal Finishing*, v. 53, July 1955, p. 51-52, 58.

Numerous applications, principal features. Photograph. 7 ref. (L17, Cu)

507-L. The Slot Cell. J. B. Mohler. *Metal Finishing*, v. 53, July 1955, p. 53-58.

Testing procedure, plating and bath standards, operating current density, plating control practice. Diagrams, graphs, table. 10 ref. (L17)

508-L. Electroless Chromium. Harry J. West. *Metal Finishing*, v. 53, July 1955, p. 62-63.

Construction of plating tank, bath solution, cleaning of pieces before plating; advantages. (L14, Cr)

509-L. Instrumentation in Electroplating. J. L. M. Fletcher. *Metal Industry*, v. 86, June 24, 1955, p. 533-537.

Part that instruments play in different finishing processes and particularly their role in future developments. Diagram, photographs. (L17, S14)

510-L. Cleaning With Ultrasonics. Frank W. Hightown. *Metal Progress*, v. 68, July 1955, p. 99-104 .

Use of ultrasonic cleaning where the surfaces to be cleaned are not readily accessible or when they must be scrupulously clean, as in plating or adhesive bonding. Photographs, graphs. (L10)

511-L. Nickel Plating by Chemical Reduction. W. J. Crehan. *Product Engineering*, v. 26, July 1955, p. 148-152.

Results in greater corrosion protection and more uniformity in plate thickness over surface areas of intricate parts than can be accomplished with electroplating. Close-tolerance machined parts can be plated without requirement for post-machining or finishing, provided care is exercised in setting up the plating bath. Tables, graphs, photographs, diagrams. 4 ref. (L14, Ni)

512-L. Enameling of Zirconium. J. Schultz, H. P. Tripp, B. W. King and W. H. Duckworth. *U. S. Atomic Energy Commission, BMI-994*, Apr. 27, 1955, 22 p.

Major problems in enameling zirconium with adherent, defect-free coatings resulted from relatively low coefficient of thermal expansion of zirconium, directional thermal-expansion properties of rolled zirconium, undesirability of using enamel components of high thermal-neutron-absorption cross section and desirability of fusing the enamel below 1475° F. to avoid the alpha-beta transformation of zirconium when firing the coating. These problems were solved by suitable heat treatment of the zirconium to reduce directional properties and the use of lead-silicate type of enamel. (L27, Zr)

513-L. Tentative Specifications for Asphalt-Base Emulsions for Use as Protective Coatings for Metal. Paper from "ASTM Standards on Paint, Varnish. Lacquer, and Related Products". p. 499-500.

Specifications cover asphalt-base emulsions capable of being applied in relatively thick films. Tables. (L26, S22)

514-L. Tentative Methods of Testing Bituminous Emulsions for Use as Protective Coatings for Metal. Paper from "ASTM Standards on Paint, Varnish, Lacquer and Related Products". p. 505-508.

Procedures for testing bituminous emulsions for use in relatively thick films. (L26)

515-L. (Dutch.) **Spray Silvering of Mirrors Saves Time and Materials.** *Bedrijf en Techniek*, v. 10, no. 229; *Electronica section*, v. 8, no. 176, June 4, 1955, p. 275, 282.

Procedure of spraying silver for the production of different types of mirrors and advantages of the process. 2 ref. (L23, Ag)

516-L. (French.) **Restoration of Grooves by Welding.** H. Charbonnier. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 12, no. 5, 1955, p. 1021-1030.

Repair of rolling-mill rolls by submerged-arc deposition of wear-resistant metal. Diagrams. (L24, F23)

517-L. (German.) **Weights of Deposits, Yields, and Losses in the Wire-Spraying Process.** Hans Reininger. *Metalloberfläche*, Ausgabe B, v. 9, no. 6, June 1955, p. 81-85.

Experiments on the amount of metal deposited by the metal-spraying process and suggestions for improving the economy of metal spraying. Tables, graphs, diagrams. 9 ref. (L23)

518-L. (German.) **Corrosion-Resistant Coatings of Paint on Aluminum.** Heinz Anders. *Metalloberfläche*, Ausgabe B, v. 9, no. 6, June 1955, p. 85-87.

Treatment of aluminum exposed to different types of corroding influences; classes of suitable coatings and their characteristics. 3 ref. (L26, Al)

519-L. (German.) **Galvanic Nickel Deposits From Chloride and Sulfate Solutions.** Ernst Raub. *Metalloberfläche*, Ausgabe A, v. 9, no. 6, June 1955, p. 88-93.

Comparison of nickel chloride with nickel sulfate from the standpoint of economy of nickel plating and hardness of nickel deposit. Graphs, tables. 6 ref. (L17, Ni)

520-L. (German.) **Polishing Agents for Metal Surfaces. Silicone Polishes.** Fritz Ohl. *Metalloberfläche*, Ausgabe A, v. 9, no. 6, June 1955, p. 93-95.

Effect and advantages of silicone-containing polishing agents. (L10)

521-L. (German.) **Surface Protection of Work Pieces in the Manufacturing Processes of Mechanical Engineering.** Burchard Van der Bruggen. *Werkstoffe und Korrosion*, v. 6, no. 5, May 1955, p. 223-227.

Reduction of costs by application of a paint or varnish protective coating on cast iron work pieces while in the manufacturing process. Diagrams, graphs, table. (L26, CI)

522-L. (German.) **Corrosion and Heat Resistance of Carbon and Special Steel After Technochemical Surface Treatment.** Walther Köhler. *Werkstoffe und Korrosion*, v. 6, no. 5, May 1955, p. 228-236.

Formation and structure of surface layers. Corrosion and heat resistance of cemented, nitrided, cyanided, aluminized, chromized, siliconized, beryllized, molybdenized, tungstenized, or vanadized carbon and special steels. Tables. 75 ref (L15, ST)

523-L. (Italian.) **Simultaneous Electrodeposition of Two Metals With Special Reference to Tin Alloys.** E. S. Hedges. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 197-199.

Theoretical and practical aspects; examples of tin with copper, zinc, nickel, cobalt, lead, and cadmium. 4 ref. (L17, Sn)

524-L. (Italian.) **Research on the Electrochemical Behavior of Tin. I.** R. Piontelli, G. Serravalle and R. Ambrosetti. *Metallurgia italiana*, v 47, no. 5, May 1955, p. 200-203.

Results of experiments on kinetic and structural aspects of electrodeposition of tin alloys by measuring polarization, anodic and cathodic voltages. Diagrams, tables, graphs. 4 ref. (L17, Sn)

525-L. (Italian.) **Considerations on the Electrodeposition of Alloys.** R. Piontelli. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 204-209.

Formation of alloys by electrodeposition; kinetic and theoretical aspects. Diagram. 4 ref. (L17, Sn)

526-L. (Italian.) **Compared Fields of Application of Electrolytic and Hot-Dip Tinplate.** W. R. Lewis. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 210-215.

Use of tin plate in drawing, shearing, welding and lacquering processes. Micrographs, photograph, diagram, graph. (L16, L17, Sn)

527-L. (Polish.) **Steel Pickling in Acid Solutions.** J. Foryst. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 152-156.

Determination of effective pickling inhibitors for carbon and low alloy steels and their effects on brittleness. Difficulties arising from pickling high-silicon iron sheets are attributed to structure and chemical composition of the scale formed during annealing. Graphs, micrographs, diagram. 7 ref. (L12, Q23, CN, AY)

528-L. (Polish.) **Diffusion Coating of Steel and Chromite Treatment of Zinc Alloys.** E. Gasior. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 157-163.

Development, properties and evaluation of chromium and aluminum coating methods as anticorrosive measures; inspection and regeneration of chromizing baths and the effect of coatings on the anticorrosive value of zinc alloys. Graphs, micrographs, diagram, table. 32 ref. (L15, ST, Zn)

529-L. (Russian.) **Mechanism of Zinc Electropolishing.** A. T. Vagramian and A. P. Popkov. *Doklady Akademii Nauk SSSR,* v. 102, no. 3, May 21, 1955, p. 547-549.

Relation of anode polarization and surface glitter to electrolysis time; contrast with mechanism of silver electropolishing. Polarization curves. 8 ref. (L13, Zn, Ag)

530-L. Chemical Cleaning and Painting of Railroad Bridges. Joseph Bigos. *American Railway Engineering Association, Bulletin,* v. 57, no. 523, June-July 1955, p. 1-14.

Suitability of painting chemically cleaned and pretreated surfaces, in comparison with surfaces cleaned by hand-chipping and wire-brushing methods; Evaluation of the performance of a number of paints and coatings. Tables, diagrams, photographs. (L10, L12, L26)

531-L. Photochemical Degradation of Automobile Lacquers. Roger L. Saur. *ASTM Bulletin,* 1955, no. 207, July, p. 61-65.

Experiments show that ordinary weathering is due to light, oxygen and water. A proposed deterioration mechanism accounts for these, of which the absence of any one greatly inhibits degradation. Micrograph, diagram, graphs, photograph. (L26)

532-L. Photo-Oxidative Degradation of Alkyd Films. E. B. FitzGerald. *ASTM Bulletin,* 1955, no. 207, July, p. 65-76.

Physical effects of degradation in alkyd films quantitatively related to the conditions and chemical mechanisms that produce them. Micrographs, graphs, tables. 12 ref. (L26)

533-L. Hardfacing With the Oxy-Acetylene Flame. E. Ryalls. *British Welding Journal,* v. 2, July 1955, p. 298.

Details preparation and flame manipulation. Diagram. (L24)

534-L. Liquid Neoprene Coatings. *Corrosion Technology,* v. 2, July 1955, p. 213-217.

Properties and capabilities of the coatings; case histories. Table, photographs. 3 ref. (L26)

535-L. Prevention of Paint Failures. II. Faults Due to Brush and Dip Application. *Industrial Finishing,* v. 8, June 1955, p. 322-325.

Choice, preservation, use of brushes; causes of wrinkling and alligatoring; effects of atmosphere; choice and design of dipping tanks; effects of withdrawal rates and ventilation. Photographs, diagram. (L26)

536-L. Electrochemical Principles of Metallic Coatings. II. Mechanism of Protective Action of Metallic Coatings. L. L. Shreir. *Industrial Finishing,* v. 8, June 1955, p. 326 + 4 pages.

Polarization and its effect on protection, theory of corrosion cells of two metals in contact, determining factors of corrosion potentials. Graphs, table, diagrams, 15 ref. (L general, R1)

537-L. On the Electrodeposition of Tungsten-Cobalt Alloys From Aqueous Solutions. T. P. Hoar and I. A. Bucklow. *Institute of Metal Finishing, Transactions, Advance Copy No.* 5, v. 32, 1955, 20 p.

Equipment, materials and operating procedures. Tables, graphs. 24 ref. (L17, W, Co)

538-L. Electroforming in Electronic Engineering. P. M. Walker, N. E. Bentley, and L. E. Hall. *Institute of Metal Finishing, Transactions, Advance Copy No.* 11, v. 32, 1955, 15 p. + 4 plates.

Choice and preparation of mandrels, copper plating solutions, process control procedures, advantages. Photographs, diagram, graphs, tables. 2 ref. (L18, Cu)

539-L. The Electron Microscope in the Study of Paints. N. D. P. Smith. *Institute of Metal Finishing, Transactions, Advance Copy No.* 12, v. 32, 1955, 10 p. + 6 plates.

Theory of the electron microscope, special specimen techniques, including a method of mounting pigments and a surface replica technique. Micrographs, 7 ref. (L26, M21)

540-L. A Study of Cracking in Chromium Deposits. H. Fry. *Institute of Metal Finishing, Transactions, Advance Copy No.* 2, v. 32, 1955, 21 p. + 2 plates.

Observations of the thickness of deposit at which cracking first occurs, of the relation between cracks and striations parallel to the basis metal apparent in etched cross-sections of deposits, and of stress as a function of deposit thickness. Tables, graphs, micrographs. 14 ref. (L17, Cr)

541-L. Alkaline Solutions: What to Use for Effective Cleaning. J. B. Mohler. *Iron Age,* v. 176, July 28, 1955, p. 59-62.

Parts may be cleaned in alkaline solutions, electrolytically, by means of a steam gun, soaking, spraying, tumbling or scrubbing. In most cases, alkaline cleaning consists of four steps—clean, rinse, hot rinse, and dry—but the procedure may vary with the base metal and contaminant present. Four chemicals—sodium hydroxide, sodium metasilicate, trisodium phosphate and sodium carbonate—plus a wetting agent, will do most metal cleaning jobs. Tables, graphs. (L12, L13)

542-L. Recent Developments in Chromium Diffusion. I. Factors Controlling Processing Technique. R. L. Samuel, N. A. Lockington and H. Dorner. *Metal Treatment and Drop Forging,* v. 22, June 1955, p. 233-236.

How the conditions of processing have to be chosen according to the steel compositions and the type of coating desired, how the problems of economically treating a great variety of articles, in large or small batches, were solved. Diagram, table. 3 ref. (L15, Cr)

543-L. Cleaning and Finishing Practice for Phosphated Zinc-Coated Sheets. W. E. McFee. *Organic Finishing,* v. 16, July 1955, p. 11, 13.

Types of cleaners used, methods of cleaning, type of coating to use, methods of applications for best results. Photographs. (L12, L26)

544-L. Finishing Ductile Iron. John Starr. *Organic Finishing,* v. 16, July 1955, p. 12-13.

Factors to consider when finishing castings with organic coating materials. Photographs. (L26, CI)

545-L. Efficiency of Chromate Pigments as Anti-Corrosion Agents. George W. Grupp. *Organic Finishing,* v. 16, July 1955, p. 14-15.

Results of seawater spray corrosion tests made with 18 different chromate pigments. Tables. (L14, R11)

546-L. Give Your Pipe Coating a Chance. Warren D. Palmer. *Pipe Line News,* v. 27, May 1955, p. 45-46, 48, 2A.

Importance of independent supervision, inspection and field control in the various processes of pipe line construction. (L26, R8)

547-L. Finishes for Metals. Processes and Equipment. Robert A. Wason. *Tool Engineer,* v. 35, Aug. 1955, p. 111-120.

Methods and equipment for cleaning and painting. Photographs, diagrams. (L12, L26)

548-L. Hot Dip Galvanizing Is a Science. VI. Wallace G. Imhoff. *Wire and Wire Products,* v. 30, July 1955, p. 787 + 6 pages.

Relationship of thickness of coating to submersion time, metal thickness and bath temperature to coating thickness, and withdrawal time to weight of metal deposited. (L16)

549-L. Plating and Cladding of Beryllium. J. T. Stacy. Paper from "The Metal Beryllium", American Society for Metals, p. 295-303.

Studies of cladding beryllium with thin protective layers of suitable corrosion resistant metals by such methods as electroplating, roll cladding, deposition from a carbonyl and dip coating. Metals used in plating, preparation of surfaces, plating procedures, properties of electroplates and surface finishes. Results obtained in roll cladding beryllium with aluminum, nickel. (L17, L22, L16, Be)

550-L. (English.) **Formation of the Intermetallic Compound PtZn at Room Temperature.** H. H. Uhlig, J. S. MacNairn and D. A. Vaughn. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 302-304.

Made by electrodepositing zinc on platinum cathodes up to 100° C. Ease and rate of formation is anomalous for platinum. Table, micrographs. 8 ref. (L17, Pt, Zn)

551-L. (English.) **The Anodic Behaviour of Iron-Chromium Alloys in Sulphuric Acid Solution. II. Effect of Chlorine Ions in Electrolytes.** Susumu Morioka and Kazutaka Sakiyama. *Technology Reports, Tohoku University,* v. 19, no. 2, 1955, p. 224-238.

A study of the degree of anodic polarization, critical current density for passivity, strong oxidizing action of chlorine atoms discharged and adsorbed on the anode and reducing action of chlorine ions. Diagrams, graphs. 2 ref. (L19, Cr, Fe)

552-L. (French.) **Galvanization of Castings.** *Métallurgie et la construction mécanique,* v. 87, no. 6, June 1955, p. 535, 537, 539-540.

Critical analysis of methods used. Tables, micrographs. (L16, CI, Zn)

553-L. (French.) **Anodic Oxidation of By-Products Obtained From Oxidized and Sintered Aluminum.** J. Hérenguel, P. Lelong and M. Le Nouaille. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 369-374; disc., p. 374.

Effect of current density on film color, influence of primary-oxide films in the metals, conditions of anodic oxidation and factors characterizing the sintered products. Graphs, photographs. 6 ref. (L19, Al)

554-L. (German.) **On the Resistance to Weathering of Gray-Paints by Brushing and Spraying Processes.** Karl Buser. *Werkstoffe und Korrosion*, v. 6, no. 6, June 1955, p. 281-282.
Effect of coating methods on the resistance to weathering of anti-rust paints. In weathering experiments, brushed coats proved to be generally better than sprayed ones. (L26)

555-L. (Russian.) **Investigation of the Effect of the Periodic Variation of Current Direction in the Electrolytic Deposition of Copper From Sulfate Baths.** Iu. Ia. Vene and S. A. Nikolaeva. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 811-817 + 3 plates.
Variations in coarseness of crystalline structure of deposits under varying electrolytic conditions. Graphs, micrographs, tables, diagram. 10 ref. (L17, M26, Cu)

556-L. (Russian.) **Problem of the Throwing Power of Electrolytes.** L. I. Kadaner. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, May 1955, p. 832-838.
Factors affecting distribution of current and metal on electrode surfaces; critique of previous methods of measuring dispersibility of electrolytes. Circuit diagram. 16 ref. (L17)

557-L. Corrosion Keys: Surface Coatings. Aluminum-Bronze Alloys. Karl Bennung, Bruce Fader, Frank McElroy and I. S. Levinson. *Chemical Processing*, v. 18, July 1955, p. 74, 76, 78.
Neoprene, vinyl, epoxy and Hypalon coatings compared; aluminum-bronze alloys listed in 16 media. Graphs. (L26, Cu)

558-L. Corrosion in the Brewery. II. The Brewhouse. D. H. Edmonds. *Corrosion Prevention and Control*, v. 2, July 1955, p. 33-36, 54.
Use of zinc-rich paint and plastic-based coatings on fermenting vessels and other equipment. Photographs. (To be continued.) (L26, R4, R5)

559-L. Paint Faults and Remedies. XII. Peeling on Non-Ferrous Metals. H. Courtney Bryson. *Corrosion Prevention and Control*, v. 2, July 1955, p. 37-40.
Cleaning and pretreatment procedures which will prevent peeling; priming coats for wood. Tables. (To be continued.) (L12, L26, EG-a)

560-L. Developments in Preparatory Treatments. II. Chemical: Cleaning and Pickling. *Corrosion Prevention and Control*, v. 2, July 1955, p. 41-43.
Cleaning and conditioning cycles before electroplating copper, magnesium, molybdenum, steel, titanium or zinc. 15 ref.
(L12, L17, Cu, Mo, Mg, ST, Ti, Zn)

561-L. The Athyweld Process. *Edgar Allen News*, v. 34, July 1955, p. 154-156.
Application of weld deposited coatings to salvage worn-out cutting tools. Photographs, diagram, table. (To be continued.) (L24)

562-L. Electrodeposition of Molybdenum Alloys From Aqueous Solutions. D. W. Ernst, R. F. Amlie and M. L. Holt. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 461-469.
Nickel-molybdenum, cobalt-molybdenum and iron-molybdenum alloys were electrodeposited from aqueous solutions containing sodium molybdate, the sulfate of the codeposited metal, sodium citrate and ammonium hydroxide. Diagrams, tables, graphs, micrograph. 13 ref.
(L17, Mo).

563-L. Periodic Current Reversal in Plating Copper-Lead Alloys. Nelson W. Hovey, John L. Griffin and Albertine Krohn. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 470-473.
Apparatus, based on the commutator principle, designed and constructed to convert direct current to square-wave alternating current, applied in electrodepositing the alloys from a cyanide-tartrate solution. Diagrams, photographs. 3 ref. (L17, Cu, Pb)

564-L. The Influence of a Surface Active Agent on the Electropolishing of Copper. K. F. Lorking. *Electrochemical Society, Journal*, v. 102, Aug. 1955, p. 479-484.
Evidence indicates that the cationic surface active agent, cetyl trimethyl ammonium bromide, is adsorbed at both the anode surface and on the walls of oxygen bubbles. These factors are shown to account for the improvement in the micropolishing characteristics of the bath and in the reduction in the size of the pits formed on the anode during slow oxygen evolution. Diagrams, graphs, tables. 12 ref. (L13, Cu)

565-L. Gas Furnaces Used for Aluminum Coating Process. Arthur Q. Smith. *Industrial Heating*, v. 22, July 1955, p. 1380 + 5 pages.
Furnaces for processing; equipment for preparing metal surfaces; advantages of the processes. Photographs. (L16, Al)

566-L. Sodium Hydride Descaling of Titanium. W. J. Barth and A. L. Feild, Jr. *Metal Progress*, v. 68, Aug. 1, 1955, p. 114-116.
When sodium hydride is used to descale titanium, hydrogen will be absorbed by the metal as soon as the scale is entirely removed. To minimize hydrogen absorption, the descaling cycles should always be held to the shortest time required for scale removal. Tables, graphs. (L12, Ti)

567-L. Corrosion Resistance of Sprayed Coatings of Austenitic Steel. O. van Rossum. *Henry Brutcher Translation No.* 3433, 6 p. (Abridged from *Metalloberfläche*, v. 5, no. 5, 1951, p. 113A-115A.) Henry Brutcher, Altadena, Calif.
Previously abstracted from original. See item 804-L, 1951.
(L23, R general, SS)

568-L. Electrospark Hard Facing for Improved Erosion Resistance of Parts of Heat and Water Power Plants. A. D. Moiseev. *Henry Brutcher Translation No.* 3506, 6 p. (Abridged from *Vestnik Mashinostroeniya*, v. 35, no. 2, 1955, p. 55-57.) Henry Brutcher, Altadena, Calif.
Previously abstracted from original. See item 256-L, 1955.
(L general, AY)

569-L. (French.) **The Anodic Oxidation of the Cast Irons and a Measurement of the Rate of Anodic Oxidation by Photoelectric Reflectometry.** André Roos. *Revue de métallurgie*, v. 52, no. 6, June 1955, p. 467-472.
Measurement by means of a photoelectric cell, description of proposed device. Diagrams, graphs, micrographs, photograph. 6 ref.
(L19, R11, CI)

570-L. (Russian.) **Cathode Polarization During the Deposition of Molybdenum Alloys With Metals of the Iron Group, From Aqueous Citrate and Ammonium Electrolytes.** T. F. Frantsevich-Zabludovskayaia. *Zhurnal Prikladnoi Khimii*, v. 28, no. 7, July 1955, p. 700-710.
Polarization curves, variation of molybdenum concentration in solution. Graphs, tables. 15 ref.
(L17, Mo, Ni, Fe)

571-L. (Russian.) **The Nature of Coatings Formed During the Anode Oxidation of Magnesium and Its Alloys in Chromium Oxide Solutions.** B. A. Pospelov. *Zhurnal Prikladnoi Khimii*, v. 28, no. 7, July 1955, p. 748-750.
Analysis of the water-soluble and acid-soluble portions of the black coatings; chemical composition of coatings. Tables. 2 ref.
(L14, Mg, Cr)

572-L. (Book.) **ASTM Standards on Paint, Varnish, Lacquer, and Related Products.** 848 p. 1955. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.
A collection of all the ASTM specifications, methods of test, and definitions pertaining to paint, varnish, lacquer, and related products. Pertinent parts are individually abstract-
(L14, Mg, Cr)

573-L. (Book.) **Institute of Metal Finishing, Transactions,** (Annual Volume), v. 31, 1954, 554 p. Institute of Metal Finishing, 32 Great Ormond St., London, W.C. 1, England, £3.10.0
Thirty-two papers delivered at the Fourth International Conference on Electrodeposition and Metal Finishing, London, Apr. 21-24, 1954.
(L general)

M
Metallography, Constitution and Primary Structures

217-M. Metallurgy and Microradiography. II. R. Urlocker, J. W. Rutter and W. C. Winegard. *Canadian Metals*, v. 18, July 1955, p. 20-21, 23.
Experimental application of the technique to obtain microradiographs. Micrographs. 6 ref. (M23)

218-M. Metals, Perfect and Imperfect. T. E. Allibone. *Foundry Trade Journal*, v. 98, June 23, 1955, p. 667-675.
Review of the development of our knowledge of metallic crystals and indication of the direction from which further advances are likely to come. Diagrams, photographs, micrographs, graphs. 23 ref. (M26)

219-M. A Three-Dimensional Face-Centred Cubic Model for the Study of Crystal Phenomena. P. R. Rowland. *Institute of Metals, Journal*, v. 83, June 1955, p. 455-459 + 1 plate.
The model, containing 10^3 to 10^4 lattice units, is rapidly and accurately assembled by pouring steel ball bearings into a suitable transparent mold. Manipulation of the model has revealed a hitherto unsuspected lattice transformation, which results in the production of two new face-centered lattices bearing a twin relationship to each other but not to the original lattice. Diagrams, photographs, micrograph. 3 ref. (M26, N6, Cu)

220-M. Apparatus for Studying Irradiated Liquid Metals. R. J. Teitel. *Nucleonics*, v. 13, July 1955, p. 50-51.
Effect of irradiation on microstructure of liquid-metal fuels for power reactors. Photographs, micrographs. 1 ref.
(M27, Pb, Sn, Bi, U)

221-M. (English.) **On the Structure of Evaporated Thin Films of Metals.** Shiro Ogawa, Denjiro Watanabe and F. Eiichi Fujita. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 429-436.
Study of thickness, area, and repeat frequency of twinned layers by means of electron microscope. Micrographs, diagrams. 11 ref.
(M27, N15)

222-M. (English.) **On the Amorphous State of the Binary System of Nickel-Sulfur.** Masao Sawada, Kenjiro Tsutsumi, Toshio Shiraiwa and Masayoshi Obashi. *Physical Society of Japan, Journal* v. 10, no. 6, June 1955, p. 459-463.

Investigation and results of the measurements of the electrical resistances and crystal structures of this system. Table, diagrams, photographs, graphs. 5 ref. (M24, M26, Ni)

223-M. (French.) **Influence of the Chemical Composition of Silicate Inclusions on the Properties of Gray Irons.** André Roos. *Fonderie,* 1955, no. 111, Apr., p. 4465-4473.

Aceto-cupric method of determining silica inclusions in gray irons. Diagram, photographs, graphs, micrographs, tables. 10 ref. (M28, CI)

224-M. (French.) **Electron-Diffraction Study of the Composition of Oxidation Films on Iron and Different Binary Alloys.** J. Moreau and J. Bénard. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 109, May 1955, 26 pages + 12 plates.

Nature of the phases of oxidation films on iron and iron-nickel, iron-chromium and nickel-chromium alloys; development of structure and texture of these phases during oxidation. Tables, diagrams, micrographs. (M22, M26, Fe, Cr, Ni)

225-M. (German.) **Iron-Cobalt-Vanadium Ternary System. I. Formation of the Ternary System in Case of Inhibited Alpha-Gamma Transformation.** Werner Köster and Heinz Schmid. *Archiv für das Eisenhüttenwesen,* v. 26, no. 6, June 1955, p. 345-353.

Thermal, dilatometric, magnetic, microscopic and X-ray investigations for determination of constitution diagram. Diagrams, graphs, micrographs. 26 ref. (M24, Co, Fe, V)

226-M. (German.) **Structure Invsetigation of Multiple-Component Systems by Kinetic Electron Diffraction.** Alfred Boettcher, Günter Haase and Rudolf Thun. *Zeitschrift für Metallkunde,* v. 46, no. 5, May 1955, p. 386-400.

Continuous recording of electron-diffraction diagrams requiring wedge-shaped specimens prepared by a special vapor-deposition process; preparation of specimens and the recording camera; interpretation of electron-diffraction photographs of silver-tin, gold-tin, silver-lead-tin, and silver-antimony alloys. Graphs, diagrams, micrographs. 34 ref. (M22)

227-M. (Russian.) **Position of Copper and Magnesium Atoms in the Structure of CuMgSn.** E. I. Gladyshevskii and P. I. Kripiakevich. *Doklady Akademii Nauk SSSR,* v. 102, no. 4, June 1, 1955.

Crystallographic study of ternary intermetallic compound CuMgSn. Tables, diagrams. 6 ref. (M26, Cu, Mg, Sn)

228-M. (Russian.) **Development of Binary Alloy Phase Diagrams in Connection With the Interaction Between Particles of Alloyable Elements.** T. Lebedev. *Zhurnal Obshchei Khimii,* v. 25, no. 5, May 1955, p. 898-902.

Provides new systematization where gradiations of the combinations of elements and transition of these gradations from one type to another are indicated. Diagrams. 5 ref. (M24)

229-M. **Relaxations in the Attenuation of Single Crystal Lead at Low Temperatures and Their Relation to Dislocation Theory.** W. P. Mason. *Acoustical Society of America, Journal,* v. 27, July 1955, p. 643-653.

Measured results correlate well with a relaxation due to the displacement of a dislocation from one atomic line to an adjacent one against the limiting shearing stress of the crystal. Graphs, diagrams. 15 ref. (M26, Pb)

230-M. **The Equilibrium Diagram of the System Nickel-Titanium.** D. M. Poole and W. Hume-Rothery. *Institute of Metals, Journal,* v. 83, July 1955, p. 473-480.

Investigation of the system above 900° C. by thermal, microscopical and X-ray methods. Tables, diagrams. 18 ref. (M24, Ni, Ti)

231-M. **Equilibrium Relations at 460° C. in Aluminium-Rich Alloys Containing 0-7% Copper, 0-7% Magnesium, and 2.0% Silicon.** H. J. Axon. *Institute of Metals, Journal,* v. 83, July 1955, p. 490-492.

Additional information about the 2.0% silicon section, reliability with which a solid model of the aluminum-rich corner of the quaternary isothermal model may be constructed. Diagrams, table. 3 ref. (M24, Al, Cu, Mg, Si)

232-M. **Foreign Atoms in Metals.** J. D. Fast. *Philips Technical Review,* v. 16, June 1955, p. 341-351.

Influence of interstitial atoms in metals and their effect on hardness and brittleness. Diagrams, graphs. 14 ref. (M25, Q23, Q29)

233-M. **Solution of the Hartree-Fock-Slater Equations for Silicon Crystal by the Method of Orthogonalized Plane Waves.** Truman O. Woodruff. *Physical Review,* v. 98, ser. 2, June 15, 1955, p. 1741-1742.

Orthogonalized plane wave (OPW) method is used to compute estimates of the energy eigenvalues associated with states for which $k = 0$ in the valence and conduction bands of a perfect silicon crystal. Table. 5 ref. (M26, Si)

234-M. **Lattice Resistance to Dislocation Motion at High Velocity.** Edward W. Hart. *Physical Review,* v. 98, ser. 2, June 15, 1955, p. 1775-1776.

Dissipative effects at high velocities, resulting from coherent collisions of dislocations with the lattice sites, were estimated and found to be too small to limit the dislocation velocity. 7 ref. (M26)

235-M. **Metallography of Beryllium and Beryllium-Rich Alloys.** Murray C. Udy. Paper from "The Metal Beryllium". American Society for Metals, p. 505-529.

Development and modification of various techniques used in the microscopic examination of the metals. A generally useful scheme is presented and the procedures of individual laboratories compared in tabular form. Tables, micrographs. 15 ref. (M21, Be)

236-M. (English.) **Bravais' and Kossel-Stranski's Theories of Homopolar Crystals and Their Application to Elements.** Gösta Wranglén. *Acta Chemica Scandinavica,* v. 9, no. 4, 1955, p. 661-676.

Correlation of lattice structure to crystal habit or external face development. Tables diagrams. 34 ref. (M26)

237-M. (English.) **Dislocations in Low-Angle Boundaries in Germanium.** F. L. Vogel, Jr. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 245-248.

X-ray and microscopic studies show correlation between dislocation spacings in the boundary and observed pit spacing. Graphs, diagrams, photograph, micrographs. 10 ref. (M26, Ge)

238-M. (English.) **Structure and Polygonization of Bent Zinc Monocrystals.** John J. Gilman. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 277-288.

Crystallography and distribution of dislocations in freshly bent crystals, kinetics of polygonization. Graphs, diagrams, photographs, micrographs. 27 ref. (M26, Q24, Zn)

239-M. (Englsh.) **Crystal Perfection in Aluminum Single Crystals.** T. S. Noggle and J. S. Koehler. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 260-267.

A high-resolution X-ray diffraction technique used on annealed single crystals of aluminum to estimate dislocation densities and distributions. Tables, graphs, diagrams. 9 ref. (M26, Al)

240-M. (English.) **The Deformation of Single Crystals of Alpha-Brass.** Heather M. Murphy and E. A. Calnan. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 268-273.

Single crystals, deformed in tension, studied by X-ray and micrographic methods. Shows connection between the orientation dependence of cross-slip and the unequal hardening of active and latent slip planes. Tables, graphs, diagrams, micrographs. 15 ref. (M26, Q24, Cu)

241-M. (German.) **Determination of the Dislocation Density in Deformed Iron.** W. Köster and L. Bangert. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 274-276.

In iron, containing carbon and nitrogen, damping-temperature curves were investigated in relation to foreign atoms in solid solution and the degree of cold working. Tables, graphs. 12 ref. (M26, Q24, Fe)

242-M. (English.) **The Origin of Screw Dislocations—Role of Colloidal Particles.** G. W. Sears. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 299-300.

Compares work on cadmium iodide platelets from solution and para-toluidine platelets from vapor. Mentions new work with colloidal-free cadmium iodide crystals. 4 ref. (M26, Cd)

243-M. (English.) **On the Formation of Dislocation Networks in Some Crystal Lattices.** Francisco Eiichi Fujita. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 1, Feb. 1955, p. 50-55.

Growth and mutual connection of the dislocation rings and eventual formation of networks geometrically discussed in reference to a face-centered cubic lattice. Diagrams, tables. 6 ref. (M26)

244-M. (English.) **The Light-Figure Phenomenon Revealed and Crystal Planes Developed by Etching in Tetragonal Tin Crystals and the Determination of Their Crystal Orientations by the Light-Figure Method. I. The Light-Figure Phenomenon Revealed and Crystal Planes Developed by Etching. II. Orientation Determination by Light Figures.** Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 2, Apr. 1955, p. 145-172.

The light figures revealed by and crystal planes developed in single crystals of tetragonal tin, etched with various concentrated aqueous solutions of acids, alkalis or salts for various time-intervals, studied and suitability of observed light figures for the orientation determination examined. Application of light figures to the orientation determination of single crystal rods of tetragonal tin. Tables, diagrams, photographs. 23 ref. (M26, Sn)

245-M. (English.) **Further Studies on the Orientation Determination of Cubic Metal Crystal Rods by the Light-Figure Method.** Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku Uni-*

versity, ser. A, v. 7, no. 2, Apr. 1955, p. 173-183.

Factors affecting the precision, accurately determinable ranges of orientation angles and kind and number of applicable light figures or of accurately determinable angles fully explained. Tables, diagrams. 9 ref. (M26)

246-M. (English.) Electron Diffraction Study on Titanium Attacked by Various Acids. Shiro Ogawa and Denjiro Watanabe. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 184-193.

Titanium surfaces attacked by hydrofluoric acid, hydrochloric acid, sulfuric acid, phosphoric acid, nitric acid, aqua regia, chromic acid, sodium chloride solution or ferric chloride solution examined by reflection method. Tables, diagrams, photographs. 8 ref. (M22, R5, Ti)

247-M. (English.) Slow Motion of Dislocation in Face-Centered Cubic Crystal. Hideji Suzuki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 7, no. 2, Apr. 1955, p. 194-203.

Calculation of the mechanism of microcreep on basis of the chemical interaction mechanism. Diagrams, graphs. 10 ref. (M26)

248-M. (Czech.) Effect of Tantalum Carbide and Niobium Carbide Additions on Properties of Sintered Carbides. Curt Agte and Vladimir Dufek. *Hutnické Listy*, v. 10, no. 6, June 1955, p. 322-329.

Effect of small additions upon properties of tungsten carbide-cobalt and tungsten carbide-titanium carbide-cobalt systems. Grain refining effect of low additions (up to 2%) to the tungsten carbide-cobalt system and increase of hardness indicated. Graphs, micrographs. 18 ref. (M27, Q29, Co, Nb, Ta, W)

249-M. (French.) Evolution of the Structure of a Modified Hot Tough 80-20 Nickel-Chromium Type Alloy. Jack Manenc. *Comptes rendus*, v. 240, no. 25, June 20, 1955, p. 2413-2415.

Describes appearance of "satellite rays" on Debye-Scherrer diagrams during X-ray investigation of the structure of alloy during first stages of tempering. Table. 3 ref. (M26, J29, Ni, Cr)

250-M. (German.) The Ability of Zinc to Form Alloys With Tungsten and Molybdenum. Werner Köster and Heinz Schmid. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 462-463.

Reaction of zinc with tungsten and molybdenum in the region of 1100 to 1350° C. Tungsten-zinc and molybdenum-zinc systems and analysis of the component crystal structures. Micrographs. 3 ref. (M24, Mo, W, Zn)

251-M. (German.) Formation of Binary and Complex Systems of B-Metals. I. The System of Gallium With B-Metals. Heinz Spengler. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 464-467.

Gallium-thallium system, binary, ternary, quaternary and polynary systems of gallium with B-metals. Tables, diagrams. 10 ref. (M24, Ga)

252-M. (German.) Constitutional Diagram of Beta-Phase in the Cobalt-Zinc System. Werner Köster and Heinz Schmid. *Zeitschrift für Metallkunde*, v. 46, no. 6, June 1955, p. 468-469.

Magnetometric determination of saturation curve of the beta-1 phase for cobalt. Table, phase diagram, micrograph. 2 ref. (M24, Co, Zn)

253-M. A Study of the Titanium-Germanium System in the Region 0-11 Atomic Per Cent. Germanium. M. K. McQuillan. *Institute of Metals, Journal*, v. 83, July 1955, p. 485-489 + 1 plate.

Germanium is found to cause a slight elevation of the transformation temperature of titanium, a peritectoid reaction in which β-titanium reacts with Ti_5Ge_3 to form α-titanium occurring at approximately 897° C. Table, micrographs, graphs. 7 ref. (M24, Ge, Ti)

254-M. A Contribution to the Vanadium-Oxygen Phase Diagram. W. Rostoker and A. S. Yamamoto. *American Society for Metals, Transactions*, v. 47, p. 1002-1017.

A partial diagram in the range 0-26 wt. % oxygen was constructed on the basis of metallographic, X-ray diffraction and resistometric studies; characteristic features cited. Tables, graphs, micrographs. 9 ref. (M24, V)

255-M. Transformation Studies in Iron-Carbon-Titanium-Vanadium Alloys and the Distribution of Carbon Between These Elements. Moss V. Davis and W. P. Fishel. Paper from *"American Society for Metals, Transactions"*, v. XLVII, p. 605-610.

Vanadium and titanium uncombined with carbon gave transformation temperatures which fit the binary iron-vanadium diagram and the ternary iron-vanadium-titanium diagram. Tables, graphs. 2 ref. (M24, Fe)

256-M. Etching of Steels by Ionic Bombardment. I. N. Prilezhaeva, G. V. Spivak and M. I. Malkina. *Henry Brutcher Translation No.* 3459, 8 p. (Abridged from *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 11, 1954, p 2090-2096.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 56-M, 1954. (M21, AY, SS)

257-M. The Chemical Nature of the Sigma Phase in the Iron-Chromium System. A. T. Grigor'ev, N. M. Gruzdeva and I. A. Bondar. *Henry Brutcher Translation No.* 3454, 13 p. (Condensed from *Izvestiya Sektora Fiziko-Khimicheskogo Analiza*, v. 21, 1954, p. 132-143.) Henry Brutcher, Altadena, Calif.

Nature of sigma phase in the light of hardness measurements. Correlation of results of present research with literature (chiefly Russian). Tables, diagrams, micrographs. 7 ref. (M26, Cr, Fe)

258-M. (English.) Interfaces Between Crystals. Cyril Stanley Smith. Paper from "L'état solide". Institut International de Physique Solvay, p. 11-44; disc., p. 45-53.

Properties of grain boundaries, variation of grain boundary energy with orientation, composition changes at single phase crystal interfaces. Micrographs, diagrams, tables, graphs. 44 ref. (M26)

259-M. (English.) Crystal Growth and Dislocations. F. C. Frank. Paper from "L'état solide". Institut International de Physique Solvay, p. 315-335; disc., p. 336-343.

Theories, surface nucleation, growth spiral interactions. Diagrams, graphs, micrographs. 26 ref. (M26, N12)

260-M. (English.) On the Generation of Vacancies by Moving Dislocations. Frederick Seitz. Paper from "L'état solide". Institut International de Physique Solvay, p. 377-407; disc., p. 408-413.

Mode of generation and densities of generated vacancies, mobility of vacancies and pairs. Influence of cold work on rate of precipitation. Diagrams, graphs. 34 ref. (M26, N7)

261-M. (English.) Dislocation Models of Grain Boundaries. W. Shockley. Paper from "L'état solide". Institut International de Physique Solvay, p. 431-484; disc., p. 485.

Origin of grain boundary energy, cold work effects. Diagrams, tables, graphs. 28 ref. (M27, M26)

262-M. (French.) Periodicity Defects in the Networks of Solid Solutions. A. Guinier. Paper from "L'état solide". Institut International de Physique Solvay, p. 197-230; disc., p. 231-233.

Applications of X-rays to the study of the disorder of structures of mixed crystals. Graphs, diagrams, tables. 38 ref. (M26, N10)

263-M. (German.) Discussion of the Theory of Dislocation. U. Dehlinger. Paper from "L'état solide". Institut International de Physique Solvay, p. 415-419; disc., p. 420-425.

Critical analysis of the theory. Diagrams. 5 ref. (M26)

N

Transformations and Resulting Structures

280-N. Effect of Cobalt on Diffusion of Carbon. (Digest of "Influence of Cobalt on the Diffusion of Carbon in Iron-Carbon Alloys", by V. A. Yurkov and M. A. Krishtal; *Doklady Akademii Nauk SSSR*, v. 92, 1953, p. 1171-1173.) *Metal Progress*, v. 68, July 1955, p. 148, 150.

Previously abstracted from original. See item 16-N, 1954. (N1, Fe, Co)

281-N. Progress Report on Loading of Titanium With Deuterium. James W. Ruff. *U. S. Atomic Energy Commission UCRL-4496*, May 1955, 7 p.

A system that permitted loading with deuterium gas of high purity was designed and built. Some of the parameters affecting amounts and purity of the absorbed gas were investigated. Diagrams. 5 ref. (N15, Ti)

282-N. (English.) On the Mechanism of Aging in Aluminium-Silver Alloys. III. Variation of the Young's Modulus. Kayako Tanaka, Hidetaro Abe and Ken-ichi Hirano. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 454-458.

Investigation to obtain the isothermal aging and heating curves of the Young's modulus on various age hardening alloys, such as Al-Ag, Al-Cu, Al-Zn, Al-Mg-Zn, as well as some copper-base alloys. Diagram, graphs. 22 ref. (N7, Q21, Al, Ag, Cu, Zn, Mg)

283-N. (English.) On Producing Thin Single Crystal Foils of Aluminium Which Have Any Desired Crystallographic Orientations. Hiroshi Fujiwara and Takao Ichiki. *Physical Society of Japan, Journal*, v. 10, no. 6, June 1955, p. 468-471.

Method of producing aluminum foils (0.06 x 5 x 100 mm.³, 99.53% in purity) having definite crystallographic orientations. Photographs, diagrams. 6 ref. (N12, M26, Al)

284-N. (French.) Application of the Theory of Explosive Waves to the Growth of Martensite. Charles Crussard. *Comptes rendus*, v. 240, no. 24, June 13, 1955, p. 2313-2315.

Calculations showing that a shock and reaction wave may propagate in a solid at a rate of the order of that of sound, and indicates probability that martensite is formed by this mechanism. Diagram. 5 ref. (N8, ST)

285-N. (French.) Micrographic Study of the Eutectoid Transformation in

Nonalloyed Cast Irons. Michel Ferry and Gabrielle Aubrion. *Fonderie,* 1955, no. 112, May, p. 4497-4512.

Study of different structural changes appearing in cast irons during cooling or continuous heating, temperature variations being of the order of 150° C. per hour. Diagrams, micrographs. 16 ref. (N8, CI)

286-N. (French.) **Heat Treatment of Cast Steels. I.** *Fonderie,* 1955, no. 112, May, p. 4529-4533.

Heterogeneity of steel produced by its solidification; microscopic structure of steel due to cooling after solidification. Diagrams, micrographs. (To be continued.) (N12, N8, CI)

287-N. (French.) **Oxidation and Recrystallization of Tin Under a Reduced Pressure.** Jean-Jacques Trillat. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 349-352.

Through the use of a furnace, at controlled temperature, it was possible to follow, continuously, the passage of tin from the crystalline state to the liquid state, then its progressive transformation into the oxides—SnO and SnO_2. Diagram, photographs. 7 ref. (N5, Sn)

288-N. (French.) **The Influence of Elements of Low Solubility on the Properties of Ferrite.** W. P. Rees. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 375-391.

The very large effects which small amounts of carbon, nitrogen and oxygen have on the properties of iron. The influence of these three elements is dependent on the rate at which the alloys are cooled from an elevated temperature. Photographs, micrographs, diagram, graphs, tables. 7 ref. (N8, Fe)

289-N. (French.) **Properties of Iron Carbonitrides.** R. Bridelle and A. Michel. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 397-400.

The carbonitride phases of iron are studied. For each phase conditions of fomration, structural characteristics, Curie Point and thermal evolutionary process are specified. Graphs. 14 ref. (N8, Fe)

290-N. (German.) **Influence of External Stress on the Formation of Martensite.** Werner Schmiedel and Heinrich Lange. *Archiv für das Eisenhüttenwesen,* v. 26, no. 6, June 1955, p. 359-363.

Influence of different stresses and deformation on martensite formation in 18-8 steel; interpretation of results. Graphs. (N8, SS)

291-N. (German.) **Segregation of Copper From Supersaturated Solid Zinc Solution.** W. Gruhl. *Metall,* v. 9, no. 9-10, May 1955, p. 353-357.

Dilatometric, microscopic and X-ray investigations; effect of copper segregation on hardness and electrical resistance. Graphs, micrographs, X-ray picture. 11 ref. (N12, Q29, P15, Cu, Zn)

292-N. (German.) **Formation of Large Surface Grains in Brass From Evaporation of Zinc.** F. Erdmann-Jesnitzer and F. Günther. *Metall,* v. 9, no. 9-10, May 1955, p. 377-381.

Heat treating experiments; microstructure and X-ray examinations of specimens. Micrographs, graphs, diagrams, X-rays. 14 ref. (N3, M27, J general, Cu)

293-N. (German.) **Hexagonal Structures in Monocrystals. I. Segregation of Impurities in Metal Crystals Growing in the Melt.** F. Blaha. *Metall,* v. 9, no. 9-10, May 1955, p. 390-394.

Effect of temperature, cooling rate, atmospheric conditions and impurities on the crystallization of zinc and tin. Micrographs, graph. 17 ref. (N12, Zn, Sn)

294-N. (German.) **Hydrogen Porosity in Metals With Special Consideration of Aluminum and Its Alloys.** C. E. Ransley and D. E. J. Talbot. *Zeitschrift für Metallkunde,* v. 46, no. 5, May 1955, p. 328-337.

Determination of hydrogen content in aluminum and its alloys; diffusion of hydrogen in aluminum, copper and nickel as a function of temperature; solubility of hydrogen in aluminum and its alloys; determination of porosity; mechanism of pore formation. Graphs, tables, diagrams. 8 ref. (N1, N12, Al)

295-N. (German.) **Diffusion of Antimony, Arsenic, and Indium in Solid Germanium.** W. Bösenberg. *Zeitschrift für Naturforschung,* v. 10a, no. 4, Apr. 1955, p. 285-291.

Electrical measurement of concentration of impurities added to the molten germanium or by diffusion of vapor-deposited films into the germanium monocrystals; determination of diffusion coefficients and of effect of antimony, arsenic and indium on semiconducting properties of germanium. Tables, diagram, graphs. 25 ref. (N1, P15, Ge, As, In, Sb)

296-N. (Polish.) **Problems of the McQuaid-Ehn Test and of Austenite Grain Growth.** St. Orzechowski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 2-4, 1955, p. 164-178 + 8 plates.

In fine-grain steels, the McQuaid-Ehn grain may vary during treatment, and the tendency of austenite grains to grow may increase under certain hot working conditions or as a result of heat treatment. Conditions favoring the coarsening of grains and heat treatment necessary, to re-establish original fine grain, are determined. Micrographs, tables, graphs. 35 ref. (N3, AY)

297-N. (Russian.) **Effect of Preliminary Overheating of Steel on the Kinetics of Decomposition of Supercooled Austenite.** V. D. Sadovskii. *Doklady Akademii Nauk SSSR,* v. 102, no. 3, May 21, 1955, p. 515-517 + 1 plate.

Dependence of the persistence of this effect on the reheating temperature and rate. Secondary intragrain texture and the transformation of austenite into pearlite-troostite. Micrographs, graphs. 6 ref. (N8, ST, AY, SS)

298-N. (Russian.) **Investigation of the Diffusion of Iron in Iron-Nickel Alloys.** M. B. Nieman and A. Ia. Shiniaev. *Doklady Akademii Nauk SSSR,* v. 102, no. 5, June 11, 1955, p. 969-972.

Relation of activation energy and diffusion coefficient to alloy composition. Equations. Graphs. 12 ref. (N1, P13, Fe, Ni)

299-N. (Russian.) **Highly Sensitive Thermomagnetic Apparatus for Studying Phase Transformations in Steel.** A. N. Alfimov. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 6, June 1955, p. 1105-1110.

Operation of apparatus; amount of ferromagnetic phase required; peculiarities in curves for martensitic transformation. Table, diagrams, photograph, 2 ref. (N8, ST)

300-N. Graphite Formation in Grey Cast Irons and Related Alloys. H. Morrogh. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, June 1955, p. 655-671 + 14 plates.

Formation of flake graphite, effects of sulfur, titanium and magnesium, graphite spherulites in hypoeutectic magnesium-containing irons. Photographs, micrographs, diagrams. 48 ref. (N8, CI)

301-N. The Solid Solubility of Chromium Carbide, Cr_3C_2, in Titanium Carbide. A. Carter. *Institute of Metals, Journal,* v. 83, v. 2, July 1955, p. 481-484.

Accurate determinations of the solid solubility by X-ray diffraction and metallographic tecnniques over the temperature range 1250 to 1900° C. Diagrams. 10 ref. (N12, C-n)

302-N. Thermodynamics of Carbon Dissolved in Iron Alloys. IV. Solubility of Carbon in Fe-Si-P Melts. E. T. Turkdogan and L. E. Leake. *Iron and Steel Institute, Journal,* v. 180, July 1955, p. 269-271.

Influence of silicon on the solubility of graphite in iron-phosphorus melts within the temperature and composition range encountered in the process of ironmaking. Graphs, table. 3 ref. (N12, Fe, Si, P)

303-N. Specification of Thermally and Mechanically Induced Nonequilibrium States in AuCu by the Resistivity and Magnetoresistivity. Bernard Wiener, Gerhart Groetzinger and Rathuel McCollum. *Journal of Applied Physics,* v. 26, July 1955, p. 857-862.

Investigation of the nonequilibrium states produced by annealing of thermally disordered samples, annealing of samples, disordered by mechanical deformation, at two different temperatures, and subjecting ordered samples to different amounts of mechanical deformation. Graphs, table. 10 ref. (N10, P15, Au, Cu)

304-N. Study of the Kinetics of Ordering in the Alloy AuCu. G. C. Kuczynski, R. F. Hochman and M. Doyama. *Journal of Applied Physics,* v. 26, July 1955, p. 871-878.

Kinetics of ordering investigated by measuring change of electrical resistivity as a function of time during isothermal ordering, after various disordering heat treatments. Graphs, micrographs, table. 16 ref. (N10, Au, Cu)

305-N. Thermionic Emission Microscopy of Metals. II. Transformations in Plain Carbon Steels. R. D. Heidenreich. *Journal of Applied Physics,* v. 26, July 1955, p. 879-889.

Direct observation of transformations at temperatures above 625° C. demonstrated for both the A_3 and A_1 transformations. Graphs, micrographs. 11 ref. (N8, M21, CN)

306-N. Recovery and Recrystallization of Cold-Worked Beryllium. G. L. Tuer, D. H. Woodard, D. B. Lister and A. R. Kaufmann. Paper from "The Metal Beryllium". American Society for Metals, p. 466-504.

Effect of annealing on mechanical properties and electrical resistivity, metallographic observations on thermally treated specimens, information on the effect of recovery on X-ray line shapes in beryllium. Graphs, tables, diagrams, micrographs, photographs. 26 ref. (N4, N5, Be)

307-N. (English.) **Influence of Grain Boundaries on the Behaviour of Carbon and Nitrogen in Alpha-Iron.** G. Lagerberg and Ake Josefsson. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 236-244.

Internal friction related to diffusion, solubility and precipitation in solid solutions, grain size and boundary concentrations of carbon and nitrogen. Graphs, micrographs. 19 ref. (N1, N7, Q22, Fe)

308-N. (English.) **Self-Diffusion of Lead in Oriented Grain-Boundaries.** B. Okkerse, T. J. Tiedema and W. G. Burgers. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 300-302.

Thorium-B activated, oriented crystal sections of lead showed preferred diffusion by autoradiography. Graphs, diagrams. 12 ref. (N1, Pb)

309-N. (French.) Influence of the Purity and the Structure of the Metal on the Solubility of Oxygen in Iron. Raymond Sifferlen. *Comptes rendus,* v. 240, no. 26, June 27, 1955, p. 2526-2528.

Study made on specimens of cold worked, high-purity iron at different annealing times and temperatures. Tables. 5 ref. (N12, J23, Fe)

310-N. (French.) The Textures of Lamination and of Recrystallization of Extra Soft Sheet Steel. G. Pomey and C. Crussard. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 401-416; disc., p. 416-417.

Use of an X-ray diffraction chamber for studying the textures of the sheet identifies crystalline orientations developed during hot and cold rolling and subsequent annealing. Photographs, diagrams, tables. 26 ref. (N5)

311-N. (German.) Diffusion of Radioactive Copper in Commercial Steel. R. Lindner and F. Karnik. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 297.

Study of the diffusion rate through steel in a hydrogen atmosphere as a function of temperature. Graph. 1 ref. (N1, Cu)

312-N. Relation of Flake Formation in Steel to Hydrogen, Microstructure, and Stress. A. W. Dana, Jr., F. J. Shortsleeve and A. R. Troiano. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Aug. 1955, p. 895-904.

Transformation characteristics of austenite in a particular section play a major role in the occurrence of flakes. Isothermal and continuous cooling studies demonstrated that flake formation is particularly sensitive to nature, distribution and relative proportions of the microconstituents in the cooled sections. Tables, micrographs, graphs. (N7, AY)

313-N. Self-Diffusion of Fe in the Fe-Ni System. (Digest of "Influence of Carbon on the Self-Diffusion of Iron in the Iron-Nickel System", by P. L. Gruzin and E. V. Kuznetsov; *Doklady Akademii Nauk SSSR,* v. 93, 1953, p. 809-812.) *Metal Progress,* v. 68, Aug. 1, 1955, p. 176, 178.

Previously abstracted from original. See item 191-N, 1954. (N1, Fe, Ni)

314-N. Growth of Graphite Nodules. (Digest of "The Form of Nodules of Temper Carbon in Magnesium Cast Irons", by K. P. Bunin and A. V. Chernovol; *Doklady Akademii Nauk SSSR,* v. 95, 1954, p. 785-787.) *Metal Progress,* v. 68, Aug. 1, 1955, p. 180, 182.

Previously abstracted from original. See item 222-N, 1954. (N8, CI)

315-N. Kinetics of the Superconducting Phase Transition. T. E. Faber. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 47-50.

Experiments to determine what governs the field strength at which growth is just able to start and in what direction and how fast it proceeds. Graphs. (N6, P15, Sn)

316-N. (French.) Successions of Precipitations and the Structural Hardening in Aluminum Copper 4% Alloys. A. Saulnier. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v 21, no. 6, June 1955, p. 178-182.

Electron-microscopic investigation shows presence of successive precipitations on submicroscopic level during heat treatment and aging. Micrographs. 5 ref. (N7, J27, Al, Cu)

317-N. (Swedish.) The Effect of Tempering on the Structure and Properties of a Hardened 13% Chromium Steel. Sakari Heiskanen. *Jernkontorets Annaler,* v. 139, no. 6, 1955, p. 361-411.

Carbide reactions on tempering; investigation of carbides by light and electron microscope and by X-ray diffraction. Low corrosion resistance at certain stage of tempering explained by formation of local cells, principally due to difference in chromium content, between carbide ferrite contact surface and the rest of the ferrite. Graphs, tables, micrographs. 28 ref. (N8, J29, AY)

318-N. (English.) Grain Growth Observed by Electron Optical Means. G. W. Rathenau. Paper from "L'état solide". Institut International de Physique Solvay, p. 55-72.

Emission microscopy of changes in metal crystals in films; grain boundary movements; growth accompanying alloy phase transformations. Micrographs, graphs. 12 ref. (N3)

319-N. (English.) Recrystallization and Grain Growth in Solid Metals. W. G. Burgers. Paper from "L'état solide". Institut International de Physique Solvay, p. 73-156; disc., p. 157-166.

Structural changes taking place in metals during heat treatment, and their influence on the number, size, shape, state or orientation of the constituent crystallites. Graphs, diagrams, micrographs. 240 ref. (N3, N5)

320-N. (English.) Recent Work on Solid State Transformations in Sweden. E. Rudberg. Paper from "L'état solide". Institut International de Physique Solvay, p. 167-187; disc., p. 188-196.

Precipitation and order-disorder changes; isothermal transformation of austenite; embryology of precipitating phases. Graphs, micrographs. 20 ref. (N7, N10, N8)

321-N. (English.) Diffusion, Work-Hardening, Recovery and Creep. N. F. Mott. Paper from "L'état solide". Institut International de Physique Solvay, p. 515-534.

Review of theories; sources of dislocation rings; origin of cross slip; Kirkendall effect. Diagrams. 30 ref. (N1, N4, Q3)

322-N. (French.) Study of Interferences of Thermal Agitation Waves in Crystals: Application to the Activation of Transformations. C. Crussard. Paper from "L'état solide". Institut International de Physique Solvay, p. 345-369; disc., p. 370-375.

Calculation of the probability of cooperative movements; applications. Graphs. 20 ref. (N general)

323-N. (Book.) Grain Growth and Recrystallization in Titanium and Its Alloys. PB 111627. 70 p. 1955. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.75.

Commercial purity sponge titanium and titanium alloys, when cold worked and annealed, exhibit excessive grain coarsening. A max. average grain size is developed when annealing follows a critical amount of plastic deformation. (N3, N5, Ti)

P
Physical Properties and Test Methods

236-P. Liquid Surface Tension Measurements by Analysis of Solid-State Curvatures; Surface Tension of Liquid Germanium. R. C. Sangster and J. N. Carman, Jr. *Journal of Chemical Physics,* v. 23, June 1955, p. 1142-1145.

Procedure, based on zone-melting techniques, developed for determining liquid-gas surface tension coefficients; germanium at its melting point, in contact with helium or nitrogen, has a surface tension of 632.5 dynes per cm. Graphs, diagrams, photograph. 9 ref. (P10, Ge)

237-P. Some Magnetic Properties of Dilute Ferromagnetic Alloys. I. G. Bate, D. Schofield and W. Sucksmith. *Philosophical Magazine,* v. 46, 7th ser., no. 377, June 1955, p. 621-631.

Investigation into the variation with heat treatment of the magnetic properties of copper-cobalt and copper-iron containing small percentages of ferromagnetic component. Table, graphs, diagrams. 14 ref. (P16, J general, Cu)

238-P. The Influence of Temperature on Magnetic Viscosity. J. H. Phillips, J. C. Woolley and R. Street. *Physical Society, Proceedings,* v. 68, no. 426B, June 1955, p. 345-352.

Measurements made to demonstrate the effect of temperature on irreversible magnetic viscosity in different types of precipitation alloys—Pt-Co, Ni$_3$Au and Alnico in an undeveloped state. Graphs. 12 ref. (P16, SG-p)

239-P. The Role of Crystal Structure on Irradiation Effects on Metals. D. Wruck and C. Wert. *U. S. Atomic Energy Commission, AECU-2906,* Apr. 1955, 24 p.

The resistivity of iron increases more than that of cobalt and nickel when these metals are bombarded at −150° C. by 12 m.e.v. deuterons. The same effect was observed for iron and nickel by neutron irradiation at room temperature. Graphs, diagram, table. 3 ref. (P15, Co, Fe, Ni)

240-P. Study of Metal-Ceramic Interactions at Elevated Temperatures. F. H. Norton and W. D. Kingery. *U. S. Atomic Energy Commission, NYO-4630,* Apr. 1, 1955, 15 p.

Measurements of surface tension and contact angles of nickel-chromium and nickel-titanium alloys indicate that chromium and titanium are adsorbed at the interface much the same way as silicon from iron-silicon alloys. The adsorption of titanium is appreciable at concentrations of 0.1 % and alloys containing surface-active materials are shown to wet oxides. Diagrams, graphs. (P13, H general)

241-P. Flammability of Sodium Alloys at High Temperatures. G. P. Smith, M. E. Steidlitz and L. L. Hall. *U. S. Atomic Energy Commission* ORNL-1799, July 8, 1955, 4 p.

Data on flammability in air jets of sodium alloys at temperatures from 600 to 800° C. Examines sodium alloys containing mercury or bismuth which are nonflammable over certain ranges of composition and temperature. Graphs, diagram. 1 ref. (P12, Na)

242-P. (French.) **Thermal Conductivity of Nickel Below and Above the Curie Point.** Lionel Hugon and Jean Jaffray. *Annales de physique*, v. 10, ser. 12, June 1955, p. 377-385.

Study of thermal conductivity of nickel from ordinary temperature to 650° C., and behavior as it crosses the Curie point. Diagram, tables, graphs. 11 ref. (P11, Ni)

243-P. (French.) **Experimental Results and Attempts to Interpret the Scintillation Effect of Granular Metallic Layers.** Nicolas Nifontoff. *Comptes rendus*, v. 240, no. 22, June 1, 1955, p. 2128-2130.

Compares variations of resistance and scintillation effects of thin layers of silver as a function of the intensity of the d.c. that passes through them and an interpretation of these phenomena. Graphs. 5 ref. (P15, Ag)

244-P. (French.) **Effects of Elastic Deformations on Superconductivity. I. Case of Tin.** Claude Grenier. *Comptes rendus*, v. 240, no. 24, June 13, 1955, p. 2302-2304.

The variation ΔH_c of the critical field, under the effect of elastic deformations, studied as a function of temperature. Graphs. 7 ref. (P15, Q21, Sn)

245-P. (German.) **Malleable Copper-Chromium Alloys as a Material for the Electric Industry.** Hans-Gerhard Petri and Hugo Vosskühler. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 11, June 1955, p. 380-385.

Effect of heat treatment and cold working on electrical properties at normal and elevated temperatures. Graphs, photograph, tables, diagram. 12 ref. (P15, Cu)

246-P. (German.) **Conductivity Measurements on Electrolytically Produced Metal Foils.** Albert Keil. *Metalloberfläche*, Ausgabe A, v. 9, no. 6, June 1955, p. 81-84.

Measurement with eddy-current testing instrument and results compared with known conductivities of compact metals. Photographs, tables, graph. 5 ref. (P15)

247-P. (German.) **Magnetic Analysis of Sintered Copper-Nickel Parts.** Karl Torkar and Helmut Götz. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 371-377.

New, accurate, magnetic scale for determining the effect of composition of solid copper-nickel solutions on saturation, magnetization and Curie temperature, and for the quantitative investigation of the sintering process. Diagrams, graphs, tables. 10 ref. (P16, H15, Cu, Ni)

248-P. (Polish.) **Magnetic Methods of Testing Hard and Soft Magnetic Materials.** L. Kozlowski. *Prace Instytutow Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 209-214.

Principles and design of the hysteresis tester for determining magnetic hysteresis loop and of demagnetization curve of materials for permanent magnets; types of coercimeters for rapid measurement of the coercive force of magnetization; design of magnetometer for examining magnetic anisotropy and of the texture of cold rolled ferromagnetic strips. (P16, SG-n, p)

249-P. (Russian.) **Problem of Ionic and Homopolar Bond in Semiconductors.** I. M. Tsidil'kovskii. *Doklady Akademii Nauk SSSR*, v. 102, no. 4, June 1, 1955, p. 737-740.

Investigation of thermoelectric and electromagnetic phenomena in PbS, PbSe, PbTe and Cu_2O to determine the type of prevalent bond. Graph. 23 ref. (P15, P16, Pb, Se, Te)

250-P. (Russian.) **Effect of Impurities on the Surface Tension and Recrystallization of Tin.** V. K. Semenchenko, E. Kristian, and V. I. Iveronova. *Doklady Akademii Nauk SSSR*, v. 102, no. 5, June 11, 1955, p. 973-975.

Effect of aluminum, manganese, zinc, tellurium bismuth and sodium impurities on grain size and polymorphic transformation of four types of tin (purified by prolonged heating in vacuum technical grade, etc.). Recrystallization temperatures. Tables. 4 ref. (P10, N5, M27, Sn, Al, Mn, Zn, Te, Bi)

251-P. (Russian.) **Properties and Structure of Ternary Semiconductor Systems. I. Electrical Properties and Structure of Some Materials in a System Thallium-Antimony-Selenium.** B. T. Kolomiets and N. A. Goriunova. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 6, June 1955, p. 984-994.

Sign of the carriers, thermal e.m.f., conductivity and photoconductivity. Graphs, tables, phase diagrams, micrographs. 2 ref. (P15, T1, Sb, Se)

252-P. **The Domain Model of Hysteresis. I. Independent Domains.** J. A. Enderby. *Faraday Society, Transactions*, v. 51, June 1955, p. 835-848.

Studies of domains in thermodynamic equilibrium. Graphs, diagrams. 4 ref. (P16, P12)

253-P. **Adsorption Studies on Metals. IV. The Physical Adsorption of Argon on Oxide-Coated and Reduced Nickel.** A. C. Zettlemoyer, Yung-Fang Yu and J. J. Chessick. *Journal of Physical Chemistry*, v. 59, July 1955, p. 588-592.

Comparison of the conclusions from a free energy function with those of isosteric heats and entropies. Table, graphs. 10 ref. (P13, Ni)

254-P. **Atomic Heats of Copper, Silver, and Gold From 1° K to 5° K.** William S. Corak, M. P. Garfunkel, C. B. Satterthwaite and Aaron Wexler. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1699-1707.

Determinations in the temperature interval 1.0 to 5.0° K. The measured values can be described adequately by a linear plus a cubic term in temperature. Diagram, graphs, tables. 25 ref. (P12, Cu, Ag, Au)

255-P. **Magnetization Reversal in Thin Films.** R. L. Conger. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1752-1754.

An experiment was performed which indicates that magnetization reversal, in evaporated films of 80% nickel, 20% iron, 2×10^{-5} centimeter thick, takes place by domain rotation rather than by the motion of 180° domain walls. Photograph, diagrams. 2 ref. (P16, Ni, Fe)

256-P. **Pressure Dependence of the Resistivity of Silicon.** William Paul and G. L. Pearson. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1755-1756.

The variation of resistivity of high-purity single crystals measured as a function of hydrostatic pressure in the intrinsic range. Results interpreted to give a decrease in energy gap between conduction and valence bands with applied pressure. Graphs. 6 ref. (P15, Si)

257-P. **Optical and Impact Recombination in Impurity Photoconductivity in Germanium and Silicon.** N. Sclar and E. Burstein. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1757-1760.

Impact (three-body) recombination and optical recombination coefficients calculated for hydrogen-like impurity centers in extrinsic germanium and silicon in thermal equilibrium. Tables. 12 ref. (P15, Ge, Si)

258-P. **Water-Vapor-Induced *n*-Type Surface Conductivity on *p*-Type Germanium.** R. H. Kingston. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1766-1774.

By utilizing a direct reading instrument, it is possible to measure the *n*-type surface conductance of the *p*-type germanium in an *n-p-n* junction transistor as a function of relative humidity, ambient gas and surface treatment. Diagrams, tables, graphs. 19 ref. (P15, Ge)

259-P. **Nuclear Magnetic Resonance Saturation and Rotary Saturation in Solids.** Alfred G. Redfield. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1787-1809.

Nuclear spin-lattice relaxation times of aluminum-27 in pure aluminum and copper-63 in annealed pure copper measured with a nuclear induction spectrometer, by the saturation method. "Rotary saturation" is observed by applying an audio-frequency magnetic field to the sample in the d.c. field direction while observing the dispersion derivative at resonance with a large R.F. field. Graphs, diagrams, table. 44 ref. (P16, Al, Cu)

260-P. **Magnetic Susceptibility of α Manganese at Low Temperatures.** A. Arrott, B. R. Coles and J. E. Goldman. *Physical Review*, v. 98, ser. 2, June 15, 1955, p. 1864-1865.

Measurements made by an induction technique in which a disk-shaped sample is translated between two detecting coils connected in series opposition. Table. 9 ref. (P16, Mn)

261-P. **Free Energy Functions of the Solid and Liquid Elements.** Leo Brewer. *U. S. Atomic Energy Commission, UCRL-2992*, May 1955, 7 p.

Thermodynamic data for metals at various temperatures. Tables. 8 ref. (P12)

262-P. **The Nuclear Properties of Beryllium.** John R. Stehn. Paper from "The Metal Beryllium". American Society for Metals, p. 328-366.

Behavior of beryllium towards "mold", "warm", epithermal and fast neutrons; electromagnetic radiations; reactions produced by deuterons, alpha particles and protons. Graphs, tables. 153 ref. (P10, Be)

263-P. (English.) **A Calorimetric Investigation of the System Silver-Tin at 450° C.** O. J. Kleppa. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 255-259.

Heats of formation of ten different solid alloys ranging in composition from 75 to 94 at.% silver derived from heats of solution of the alloys in liquid tin. Graphs, tables. 11 ref. (P12, Ag, Sn)

264-P. (English.) **Application of Gibbs-Duhem Equations to Ternary Systems.** R. Schuhmann, Jr. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 219-226.

A new method for calculating activities, activity coefficients and other partial molal properties for two components in a ternary system by examination of the property in the third component. The derived relations are used to calculate activities of silica, iron oxide and oxygen in ternary iron silicate slags. Phase diagrams. 15 ref. (P12, Fe)

265-P. (English.) **Calorimetric Investigations of a Gold-Nickel Alloy. I. Low Temperature Heat Capacity of Gold-Nickel Alloy. II. The Heat Capacity at High Temperatures and the Entropy of Formation.** Warren DeSorbo and R. A. Oriani. *Acta Metallurgica*, v. 3, no. 3, May 1955, p. 227-235.

Values of entropy, enthalpy and free energy evaluated from 13 to

300° K., estimate obtained of the vibrational contribution to the entropy of mixing. Furnishes careful measurements of the deviation from the Kopp-Neumann rule. Tables, graphs. 53 ref. (P12, Au, Ni)

266-P. (English.) Effect of Order on the Electrical Resistivity of Ferromagnetic Alloys. F. J. Donahoe. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 292-293.

Four cases discussed, based on positions of the Curie and critical temperatures. Graphs. 5 ref. (P15, Fe, Ni, Pt)

267-P. (English.) Grain Boundaries in Alloys of High Magnetic Permeability. R. E. S. Walters. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 293-294.

Relates development of high magnetic permeability in nickel-iron-copper-molybdenum alloys to reduction in grain boundaries. Table, graph. (P16, Ni, Fe, Cu, Mo)

268-P. (English.) An Electron Transfer Mechanism for Ultrasonic Attenuation in Metals. C. Kittel. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 295-297.

Suggests that in the superconducting state groups of electrons participate in the transfer process without interaction with lattice phonons, provision for energy conservation presumably being made by an internal energy of the group. 8 ref. (P10, P15)

269-P. (English.) Accurate Determination of Thermal Conductivities. D. G. Gillam, Lars Rombén, Hans-Erik Nissen and Ole Lamm. *Acta Chemica Scandinavica,* v. 9, no. 4, 1955, p. 641-656.

Accuracy of a hot wire precision method permits accuracy for both solids and liquids up to about ±0.3%. Diagrams, graphs. 3 ref. (P11)

270-P. (English.) On the Activities of Coexisting Elements in Molten Iron. III. The Activity of Mn in Molten Fe-Mn Alloy. Koji Sanbongi and Masayasu Ohtani. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 2, Apr. 1955, p. 204-209.

Construction of an electrode concentration cell and measurement of the e.m.f. over the whole range of the iron-manganese system. Diagrams, graphs, tables. 15 ref. (P12, Fe, Mn)

271-P. (English.) Effect of Annealing on Electric Resistance of Cold-Worked Brasses. Masayuki Kawasaki, Kenji Okuda and Yoji Takahashi. *Technology Reports, Tohoku University,* v. 19, no. 2, 1955, p. 178-191.

Changes in resistance of the brasses, subject to subsequent annealing, are divided into a two-stage behavior—one corresponding to recovery, the other to recrystallization. Data presented to clarify aspects of recovery kinetics. Tables, diagrams, graphs. 14 ref. (P15, J23, N4, N5, Cu)

272-P. (French.) An Abnormal Beta-Radiation of Metallic Uranium. Georges Vacca and Louis Perreau. *Comptes rendus,* v. 240, no. 25, June 20, 1955, p. 2404-2405

Surface concentration phenomenon of beta-activity noted after heat treatment of uranium. (P10, U)

273-P. (German.) Bases for the Development of Soft Magnetic Materials. Hermann Fahlenbrach. *Elektrotechnische Zeitschrift,* v. 76, Ausgabe A, no. 13, July 1955, p. 449-455.

Characteristics of the materials; internal process of magnetization; influence of purity; ferromagnetic semiconductors. Micrographs, graphs, diagram. 29 ref. (P16, SG-p)

274-P. (German.) A New Astatic Magnetometer for Measuring Ferromagnetic Plate Specimens in Direct and Alternating Currents. Kurt Mellentin and Heinrich Lange. *Zeitschrift für Metallkunde,* v. 46, no. 6, June 1955, p. 450-456.

Description of the instrument, structural details, theoretical bases, field of application. Table, graphs, photograph, diagrams. 7 ref. (P16)

275-P. (German.) An Isothermal Calorimeter for Metallurgical Research. Jörg Diehl and Reinhold Braun. *Zeitschrift für Metallkunde,* v. 46, no. 6, June 1955, p. 457-461.

Comparative analysis of different calorimetric methods; experimental determination of heat hardening isotherms of aluminum-silver alloy. Graphs, diagrams. 13 ref. (P12, Ag, Al)

276-P. (Russian.) Electrical Properties of Alloys of the System Nickel-Tellurium. V. P. Zhuze and A. R. Regel'. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 6, June 1955, p. 978-983.

Electrical conductivity, its temperature coefficient, thermo-electromotive force and temperature conductivity of a system with compositions ranging from 33 to 50 at.% nickel in tellurium. Graphs, tables. 9 ref. (P15, Ni, Te)

277-P. Mechanisms of Hydrogen Producing Reactions on Palladium. James P. Hoare and Sigmund Schuldiner. *Electrochemical Society, Journal,* v. 102, Aug. 1955, p. 485-489.

Hydrogen overvoltage mechanisms on palladium, in H_2SO_4 and H_2SO_4 + Na_2SO_4 solutions, postulated in three regions. Graphs. 12 ref. (P15, Pd)

278-P. Activity of Sulphur in Liquid Fe-Ni Alloys. Jean A. Cordier and John Chipman. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Aug. 1955, p. 905-907.

Using gas equilibrium methods, the chemical behavior of sulfur in liquid steel is independent of the nickel content and has the same activity and free energy in liquid nickel and iron-nickel alloys as in liquid iron. Table, graph. 7 ref. (P12, Fe, Ni)

279-P. The Significance of Wetting in Reactor Technology. J. W. Taylor. *Journal of Nuclear Energy,* v. 2, Aug. 1955, p. 15-30.

Fundamental forces responsible for the spreading of a liquid metal on a solid (or a liquid) surface, interfacial tension and spreading studies analyzed in terms of theoretical considerations. Diagrams, tables, graph. 32 ref. (P10)

280-P. Surface Tension at Elevated Temperatures. II. Effect of C, N, O and S on Liquid Iron Surface Tension and Interfacial Energy With Al_2O_3. F. A. Halden and W. D. Kingery. *Journal of Physical Chemistry,* v. 59, June 1955, p. 557-559.

At 1570° C., surface tension of pure iron is 1720 dynes $cm.^{-1}$. Oxygen and sulfur form monolayers when below 0.1%. Table, graphs. 13 ref. (P10, Fe)

281-P. Thermodynamic Analysis of Two-Component and Multicomponent Systems. I. Determination of Activities of Components in Homogeneous and Heterogeneous Systems From Calorimetric Measurements Alone. W. Oelsen, E. Schürmann and G. Heynert. *Henry Brutcher Translation No.* 3521, 21 p. (Condensed from *Archiv für das Eisenhuttenwesen,* v. 26, no. 1, 1955, p. 19-25.) Henry Brutcher, Altadena, Calif.

Usefulness of the analysis in solving technically important problems by calorimetry. Derivation and application of basic equataions for deduction of activities of components in such systems. Graphs. 4 ref. (P12)

282-P. Superconductivity and Lattice Vibrations. J. Bardeen. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 5-10.

Nature of wave functions and energies for electrons in superconductors, theory that leads to equations that explains electromagnetic properties of the superconducting phase. Diagrams. 7 ref. (P15, M26)

283-P. On the Nature of the Superconducting Transition. L. Tisza. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 11-20.

A half phenomenological theory that provides a comprehensive qualitative framework for the quantum mechanics of solids. The adiabatic approximation, nonmetallic crystals at finite temperatures and normal and superconducting metals discussed. 12 ref. (P15)

284-P. Superconductivity of Tin Isotopes. J. M. Lock, A. B. Pippard, and D. Shoenberg. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 31-32.

Measurements of transition temperatures and critical magnetic fields of isotopes of tin that have been electromagnetically separated. 6 ref. (P15, P16, Sn)

285-P. Superconductivity at the Clarendon Laboratory. K. Mendelssohn. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 33-36.

Studies on the isotope effect, mechanism of transition and heat conductivity in the superconductivity and normal states. Table, graph. (P15, M25)

286-P. Heat Transfer in Superconducting Alloys. J. K. Hulm. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 37-41.

Experimental data for a very uniform composition, single-crystal specimen containing 10 at.% of thallium, the highest composition to which the heat conduction measurements have so far been extended. Graphs. 8 ref. (P11, P15, Tl)

287-P. Superconduction Properties of Indium-Thallium Alloys. J. W. Stout and Lester Guttman. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 51-60.

Studies behavior of a solid solution and the indium-thallium system to determine the Meissner effect and the resistance transition curve. Tables, graphs, diagrams. 7 ref. (P15, In, Tl)

288-P. Investigation of Superconductivity in Lead Compounds, Gold Alloys, and Molybdenum Carbide. R. P. Hudson and K. Lark-Horovitz. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 61-63.

Use of the ballastic-throw magnetic method of detection to distinguish between a bulk effect and an impurity. 7 ref. (P15, Au, Mo, Pb)

289-P. Magnetic Properties of a Hollow Superconducting Lead Sphere. Julius Babiskin. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Ofice, p. 77-79.

Measurements to determine nature of the equatorial magnetic field distributions inside and outside a hollow sphere. Graphs. 5 ref. (P16, Pb)

290-P. Eddy Currents and Supercurrents in Rotating Metal Spheres at Liquid-Helium Temperatures. P. B. Alers, J. W. McWhirter and C. F. Squire. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 85-88.

Data to show similarity between intensity and distribution of eddy currents and the superconducting surface currents that produce the Meissner effect. Diagram, graphs. 2 ref. (P16, P15, Sn)

291-P. Atomic Heat of Indium at Liquid-Helium Temperatures. J. R. Clement and E. H. Quinnell. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 89-97.

Calorimetric measurements to determine specific heat of superconducting elements in both the normal and superconducting states. Diagram, graph. 11 ref. (P12, P15, In)

292-P. Specific Heat of Niobium at Various Temperatures. A. Brown, M. W. Zemansky and H. A. Boorse. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 99-101.

Method of circumventing discrepancies in the calculation of the specific heat by the use of calorimetry. Graphs. 3 ref. (P12, Cb)

293-P. High-Frequency Resistance of Tin, Lead, and Indium. C. J. Grebenkemper and John P. Hagen. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 103-108.

Surface resistance of several metals measured, using a resonant cavity of cylindrical shape operating in the lowest mode. Graphs. 6 ref. (P15, In, Pb, Sn)

294-P. A New Effect Found in Paramagnetic Crystals Below 100 Millidegrees Absolute: The Critical-Field Curve Bounding the Antiferromagnetic State. C. G. B. Garrett. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 229-233.

Evidence for the existence of "critical-field" phenomena in antiferromagnetic crystals, considering, in particular, results of some magnetic measurements made at temperatures below 1 K° on a single crystal of cobalt-ammonium sulfate. Graph. 6 ref. (P16, Co)

295-P. Current Sensitivity and Other Characteristics of Metal Films at Low Temperatures. A. van Itterbeek. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 243-247.

Resistance of thin nickel films at low temperatures. Graphs, micrographs. 5 ref. (P15, Ni)

296-P. Normal Resistivities at Low Temperatures. K. Mendelssohn. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 253-256.

Temperature dependence of the resistivity of the alkali and alkaline earth metals. Graphs. (P15, Na, Li)

297-P. Approximate Calculations of the Surface Impedance of a Metal in the Anomalous Region. P. M. Marcus. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 265-272.

Phenomenon in metals, considering the current and field separately as functions of position. Graphs, diagram. 6 ref. (P15)

298-P. Specific Heat on Silicon Below 100° K. P. H. Keesom and N. Pearlman. Paper from "Low-Temperature Physics". Superintendent of Documents, U. S. Government Printing Office, p. 279-283.

Extension of the measurements of specific heat of silicon to a maximum of 103° K. Graphs. 11 ref. (P12, Si)

299-P. (Book.) **Low-Temperature Physics.** National Bureau of Standards Circular 519. 291 p. 1952. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $2.00

Proceedings of the NBS Semicentennial Symposium on Low Temperature Physics, covering properties of liquid helium, superconductivity, calorimetry, thermometry, and liquefier development. Pertinent papers are individually abstracted. (P general)

300-P. (Book.) **The 1955 Heat Transfer and Fluid Mechanics Institute.** Papers individually paged. 1955. University of California, Los Angeles. $5.50.

Twenty papers given at the University of California, Los Angeles, on heat transfer and physics of flow of gases, liquids, and metals. Tables, photographs, graphs, diagrams. 231 ref. (P general)

301-P. (Book.) **The Solid State.** (L'etat solide) R. Stoops, editor. 576 p. 1952. Institut International de Physique Solvay, 76-78, Coudenberg, Brussels, Belgium.

Sixteen English, German, and French reports on solid-state physics presented at the Ninth Council of Physics at Brussels, Belgium in Sept. 1951. Papers are individually abstracted. (P general, N general)

302-P. (Book.) **Optical Properties of Thin Solid Films.** O. S. Heavens. 261 p. 1955. Academic Press, 125 East 23rd Street, New York 10, N. Y. $6.80.

Formation; structure; optics; measurements of film thickness and optical constants. (P17, S14)

Q

Mechanical Properties and Test Methods; Deformation

760-Q. The Stress-Rupture Strength of Type 347 Stainless Steel Under Cyclic Temperature. E. E. Baldwin. *American Society of Mechanical Engineers, Paper No.* 54—A-231, 1954, 17 p. + 5 plates.

Stress-rupture tests of type 347 stainless steel were conducted in liquid sodium under constant and cyclic temperature conditions. Constant-temperature tests were conducted at temperatures between 1000 and 1200° F. and cycle times ranged from 6 to 12 hr. Tables, diagrams, photographs, graphs, micrographs. 11 ref. (Q4, SS)

761-Q. Electromachining and Superfinishing as a Production Tool. II. The Finishing of Highly Stressed Parts. A. T. Steer. *Electroplating and Metal Finishing,* v. 8, July 1955, p. 245-249.

Essential requirements of finishes for highly stressed parts; effect of mechanical and electrolytic polishing treatments on fatigue limit; methods of reinforcing surfaces which have been weakened by electropolishing. Micrographs. 3 ref. (Q7, G19, L13, ST)

762-Q. Residual Stresses in Castings. A. Portevin and J. Pomey. *Foundry Trade Journal,* v. 99, July 7, 1955, p. 9-18.

Procedures for revealing, measuring and classifying the presence or state of residual stresses, their distribution and intensity; factors promoting the origination and modification of the state of stress; influence of stresses on the existence, behavior and use of metallic components; results which apply to castings. Diagrams, graphs. (Q25)

763-Q. Tensile Properties of Some Titanium Alpha Solid Solutions up to 600° C. J. W. Suiter. *Institute of Metals, Journal,* v. 83, June 1955, p. 460-464 + 1 plate.

The ultimate tensile stress and elongation to fracture measured for two series of binary titanium alloys, one containing nitrogen, oxygen or carbon, the other containing aluminum, tin or zirconium. Graphs. 6 ref. (Q27, Ti)

764-Q. How to Select Wrought Steels. John W. W. Sullivan. *Materials & Methods,* v. 42, July 1955, p. 111-126.

A manual to aid in selecting and making better and more economical use of rolled and forged steel products. Factors and properties to be considered when choosing a steel to meet requirements of a particular application; properties of carbon, alloy, stainless and heat resisting steels. Photographs, tables. 33 ref. (Q general, CN, AY, SS)

765-Q. Examination of Microstructures Under Varying Stress. Richard A. Flinn and Paul K. Trojan. *Metal Progress,* v. 68, July 1955, p. 88-89.

A bend test apparatus that permits continuous microscopic examination of metal specimens while they are being loaded to fracture. Photograph, micrographs. (Q5, M27)

766-Q. Properties of Arc-Cast Molybdenum. Norman L. Deuble. *Metal Progress,* v. 68, July 1955, p. 105-110.

High-temperature strength is increased by alloying to higher levels than that obtained with conventional gas-turbine alloys. Tables, graphs. (Q general, Mo)

767-Q. Effect of Neutron Radiation on Aluminum Alloys. R. V. Steele and W. P. Wallace. *Metal Progress,* v. 68, July 1955, p. 114-115.

Increase in tensile and yield strength and decrease in ductility of annealed samples by neutron irradiation. Graphs, tables. (Q23, Al)

768-Q. Performance Tests on Rockwell Hardness Indentors. R. S. Marriner. *Metalworking Production,* v. 99, June 24, 1955, p. 1145-1149.

To establish an irreproachable standard of hardness, it is necessary to determine to what extent reproducibility of the standard is limited by the choice of indentor used. Preliminary work carried out at National Physical Laboratory. Tables, diagrams, graphs. (Q29)

769-Q. You Can Prevent Fatigue Failures. J. J. McKetta and W. G. Dudley. *Petroleum Refiner,* v. 34, July 1955, p. 127-128.

Mechanisms of fatigue failures, methods of testing and of detecting incipient fatigue failures. 9 ref. (Q7)

770-Q. Pressure Pulsation Tests Show Why Branch Connections Fail. A. R. C. Markel, H. H. George and E. C. Rodabaugh. *Pipe Line Industry,* v. 3, July 1955, p. 32-38.

Probable causes of failure, welding, design, superimposed loadings,

test methods, apparatus, procedure and results. Tables, diagrams, photographs. 2 ref. (Q26, K general)

771-Q. Stress Equations for Strain Gage Rosettes. C. C. Perry and H. R. Lissner. *Product Engineering*, v. 26, July 1955, p. 207, 209, 211.

A table of equations prepared as a convenient reference for calculating significant stresses from measured strains. Tables. (Q25)

772-Q. Buckling of Sandwich Cylinders of Finite Length Under Uniform External Lateral Pressure. Milton E. Raville. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1844-B, May 1955, 30 p. + 15 plates

A theoretical analysis made to obtain a solution for the critical load on circular sandwich cylinders. Tables, diagrams, graphs. 6 ref. (Q28)

773-Q. Stress-Rupture Strength of Thermenol. (Digest of "Preliminary Investigation of Stress-Rupture and Tensile Strength of Thermenol, an Iron-Aluminum Alloy", by Charles A. Gyrogak; *U. S. National Advisory Committee for Aeronautics, Research Memorandum* M-E54F10, Aug. 1954.) *Metal Progress*, v. 68, July 1955, p. 164-166.

Investigation to determine stress-rupture life at 1100 and 1200° F., room-temperature tensile strength, and bend ductility. (Q4, Fe, Al)

774-Q. Tensile Properties of Some Sheet Materials Under Rapid-Heating Conditions. George J. Heimerl and John E. Inge. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55E12b, June 1955, 10 p.

Materials tested at temperature rates from 0.2 to 100° F. per sec. under constant-load conditions. Graphs. 6 ref. (Q27, Al, Ni, Ti)

775-Q. Evaluation of the Theory on the Post-Buckling Behaviour of Stiffened, Flat, Rectangular Plates Subjected to Shear and Normal Loads. W. K. G. Floor and T. J. Burgerhout. *Netherlands Nationaal Luchtvaartlaboratorium Report* S.370, 1951, p. 9-36.

Determination of stresses and strains and the required stiffener cross sections of stiffened plates subjected to compressive and shear loads. Tables, diagrams, graphs. (Q25)

776-Q. Investigation of the Post-Buckling Effective Strain Distribution in Stiffened, Flat, Rectangular Plates Subjected to Shear and Normal Loads. W. K. G. Floor. *Netherlands Nationaal Luchtvaartlaboratorium Report* S.427, July 1953, 26 p.

Diagrams from which the largest effective strain can be determined. Tables, diagrams. (Q25)

777-Q. (English.) **Scatter in Fatigue Life of 24S-T Alclad Specimens With Drilled Holes.** Waloddi Weibull. *SAAB Aircraft Company, Technical Notes, SAAB TN 32*, 1955, 17 p.

Fatigue lifetimes of specimens determined at a tension pulsating between 14 kg. per sq.mm. and zero. Marked difference existed in fatigue properties of the different plates and also between longitudinal and transverse specimens in regard to the direction of rolling, but an average distribution function for each source was obtainable. Tables, diagram, graphs. (Q7, Al)

778-Q. (French.) **The Symmetry of Textures of Rolled Uranium.** Anatole Winogradzki. *Comptes rendus*, v. 240, no. 23, June 6, 1955, p. 2235-2237.

Analysis of X-ray symmetry diagrams of very pure uranium specimens. Diagrams, X-ray diffractograms. (Q24, U)

779-Q. (French.) **Study of Correlations Between Different Mechanical Tests of Current Gray Irons.** Francois Danis and Etienne Doat. *Fonderie*, 1955, no. 111, Apr., p. 4451-4464.

Tensile-bending, tensile-shearing, shearing-elastic modulus and tensile-hardness correlations of 20 and 30-mm. diam. bars. Influence of heterogeneity of structure. Graphs, tables, diagrams. 6 ref. (Q2, Q5, Q27, Q29, CI)

780-Q. (French.) **Influence of Phosphorus on the Correlation Between Brinell Hardness and Other Characteristics of Gray Irons.** Jean Guillamon. *Fonderie*, 1955, no. 112, May, p. 4513-4525.

Determination of mechanical properties; values of equivalent carbon content. Graphs, phase diagrams, tables. 38 ref. (Q29, CI)

781-Q. (German.) **Relation Between Appearance of Deformation of Twin Crystals and Type of Fracture in Alpha-Iron.** Herbert Buchholtz, Franz Braumann and Albert Eier. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 337-344.

Influence of rate of uniaxial stress and temperature on type of fracture and appearance of the deformation of twin crystals for four types of steel subjected to different heat treatments. Photographs, micrographs, graphs, diagram, tables. 5 ref. (Q21, Q26, Fe)

782-Q. (German.) **Effects of Corpuscular Radiation on Hardenable Alloys.** B. Neumann and E. Schmid. *Metall*, v. 9, no. 9-10, May 1955, p. 349-352.

Alpha, beta and neutron rays did not affect hardness but increased the electrical resistance of 2.15% beryllium, 97.85% copper alloy. Tables, graphs. 8 ref. (Q29, P15, Cu)

783-Q. (German.) **Plastic Cages for Antifriction Bearings and Emergency-Running Properties of Plastics.** A. Gremer. *VDI Zeitschrift*, v. 97, no. 17, June 11, 1955, p. 509-515.

Comparative tests on the effect of pressure, rate of rotation and lubricating conditions on the wear resistance of different plastic materials, brass and steel. Diagrams, tables, graphs. 22 ref. (Q9, Cu, ST)

784-Q. (German.) **The Strength of Metals as an Atomic-Physical Phenomenon.** W. Kossel. *VDI Zeitschrift*, v. 97, no. 17, June 11, 1955, p. 516-518.

Effect of crystal growth and lattice structure on the mechanical properties of metals. Diagrams, photographs. 2 ref. (Q23)

785-Q. (German.) **Internal Stresses and the Incompatibility Tensor in the Theory of Elasticity.** Ekkehart Kröner. *Zeitschrift für angewandte Physik*, v. 7, no. 5, May 1955, p. 249-257.

Development of theories of external and internal stresses in analogy to electrostatics and the theory of magnetic fields. Table, diagrams. 27 ref. (Q21)

786-Q. (Norwegian.) **Strain-Gage Measuring. Range of Application and Practical Utilization.** Just Fr. Storm. *Teknisk Ukeblad*, v. 102, no. 20, May 19, 1955, p. 411-417.

Designs and uses of different strain-gages and extensometers. Diagrams, photographs, graph, map, oscillograms. (Q25)

787-Q. (Russian.) **Dislocation of the Deep Energy Layers of Iron Atoms During Cold Deformation of the Metal.** A. I. Krasnikov, L. I. Sotnikova and L. G. Orlov. *Doklady Akademii Nauk SSSR*, v. 102, no. 5, June 11, 1955, p. 943-945.

Loads of 45,000 and 80,000 kg. per sq.cm. were used; effect of alloying elements; relation between levels and valence; duplet distances calculated. Table. 6 ref. (Q24, Fe, AY)

788-Q. (Russian.) **Quantitative Determination of Wear of Machine Parts With Radioactive Indicators.** Iu. S. Zaslavskii and G. I. Shor. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 43-52.

Comparison with results by suspension method; testing equipment and methods; choice of lubricants. Diagrams, graphs, tables, oscillogram. 15 ref. (Q9)

789-Q. (Russian.) **Temperature Effect on the Plasticity and Deformation Resistance of Technical Titanium.** E. M. Savitskii and M. A. Tylkina. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 53-57.

Microstructure, tensile and compression strength, hardness, etc., of carbon and carbon-free titanium, tempered and untempered. Graphs, micrographs, diagrams. 4 ref. (Q general, Ti)

790-Q. (Russian.) **Nitrogen in Cast Iron.** L. I. Levi. *Liteinoe Proizvodstvo*, 1955, no. 6, June, p. 22-25.

Experimental investigation of the influence of nitrogen content in cast iron on its structure and mechanical properties. Tables, micrographs. 10 ref. (Q general, M27, CI)

791-Q. Fatigue Analysis of Aircraft Bolts. Harold G. Brilmyer. *Aeronautical Engineering Review*, v. 14, July 1955, p. 48-54.

Tension fatigue tests of alloy steel and aluminum Huckbolt installations, as well as standard aircraft (AN) bolt-nut combinations. Method for determining the tensile preload present in an installed fastener. Tables, graphs, diagrams, photographs. 19 ref. (Q7, Al, AY)

792-Q. A Theory of Fatigue Damage Accumulation in Steel. D. L. Henry. *American Society of Mechanical Engineers, Paper No.* 54-A-77, 1954, 10 p. + 2 plates.

Simple theoretical model for predicting change in endurance limit resulting from the accumulation of overstressing cycles at moderate levels of overstress and for moderate degrees of fatigue damage. Tables, graphs. 14 ref. (Q7, ST)

793-Q. A New Fatigue-Testing Machine Capable of Inducing Complex Stress-Time Relationships in Its Specimen. W. L. Starkey and S. M. Marco. *American Society of Mechanical Engineers, Paper No.* 54—A-80, 1954, 8 p. + 3 plates.

Design of machine for investigating the effects of multiharmonic complex uni-axial stresses on the endurance lives of metals. Photographs, diagrams, graphs. (Q7)

794-Q. The Influence of Tap-Drill Size and Length of Engagement Upon the Strength of Tapped Holes. C. J. Oxford, Jr., and J. A. Cook. *American Society of Mechanical Engineers, Paper No.* 54—A-85, 1954, 13 p. + 5 plates.

Influence of minor diameter of threaded hole on strength of threaded assembly. Table, diagrams, graphs. 9 ref. (Q23)

795-Q. Fatigue: The Problem and Some Solutions. G. R. Gohn. *American Society of Mechanical Engineers, Paper No.* 54—A-87, 1954, 6 p. + 2 plates.

Causes and mechanism of fatigue. Examples given to show that properly designed laboratory tests will yield fatigue data which can be applied to the solution of design problems. Micrographs, graphs, photograph. 8 ref. (Q7)

796-Q The Statistical Nature of Friction. E. Rabinowicz, B. G. Rightmire, C. E. Tedholm and R. E. Wil-

liams. *American Society of Mechanical Engineers, Paper No.* 54—LUB-2, 1954, 5 p. + 2 plates.

Sliding experiments carried out using copper surfaces in solid contact; friction traces analyzed statistically to study the spontaneous fluctuations in the friction force. Results suggest that the calculation of the standard deviation of the values of the instantaneous friction force can yield much information about the nature of the sliding process. Diagram, graphs. (Q9, Cu)

797-Q. Friction in a Close-Contact System. Walter Claypoole. *American Society of Mechanical Engineers, Paper No.* 54—LUB-6, 1954, 11 p. + 2 plates.

Attempt to clarify the terms "clean" and "smooth" as associated with the surface condition of test specimens used in investigations of frictional phenomena. A "practical model" of a close-contact friction system is set up and its behavior analyzed under specified operating conditions. Photographs, diagrams, graphs, micrographs. 7 ref. (Q9)

798-Q. A Progress Report on the Surface Endurance Limits of Engineering Materials. G. J. Talbourdet. *American Society of Mechanical Engineers, Paper No.* 54—LUB-14, 1954, 13 p. + 4 plates.

Surface-wear tests to determine the load-life characteristics of materials subjected to rolling, combined rolling and sliding actions. Tables, graphs, photographs, micrographs. 7 ref. (Q9)

799-Q. Thermal Shock. Some Experiments With Cast Iron. E. R. Evans. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, June 1955, p. 643-654 + 12 plates.

Various designs of test pieces investigated and most suitable design employed to study the effects of variations of composition on the thermal shock resistance of cast iron. Tables, photographs, diagrams. 4 ref. (Q general, CI)

800-Q. Strains in Flanged Pipes. J. Y. Davies and E. J. Heeley. *British Welding Journal,* v. 2, July 1955, p. 293-297.

Comparisons between pipes of built-up and integral construction using the electrical resistance strain gage technique to determine the distribution and magnitude of strains produced under bolt loading conditions. More extensive welds add neither to strength nor safety. Graphs, diagrams, photographs. (Q25, K9)

801-Q. Design of a Comprehensive Computer for Handling Complex Creep Problems. I-II. A. J. Kennedy. *Engineer,* v. 200, July 1, 1955, p. 2-4; July 8, 1955, p. 34-35.

Consideration of the creep factor under conditions where stress and temperature are not kept constant; examination of the possibility of computing the behavior fairly rapidly from the minimum experimental data. Diagram, graphs, photograph. 16 ref. (Q3)

802-Q. A New Method of Analysing the Stresses and Strains in Deposited Coatings. H. J. Pick. *Institute of Metal Finishing, Transactions, Advance Copy No.* 3, v. 32, 1955, 15 p.

Derivation of formulas, based on changes in dimension, in terms of a parameter called the "linear free strain", defined as that strain which a deposited coating would undergo in a direction parallel to the base if it were deposited on an infinitely thin base of no mechanical strength. Diagrams, graphs, table. 4 ref. (Q25, L17)

803-Q. Creep Behaviour at 300° C. of a Group of Precipitation-Hardening Alloys Based on the Alpha Copper-Aluminium Phase. J. P. Dennison. *Institute of Metals, Journal,* v. 83, July 1955, p. 465-471 + 1 plate.

Results of experiments to provide creep data in various initial states and over a wide range of applied stresses and at a temperature where any structural changes in the unstressed condition take place at extremely slow rates, if at all. Tables, micrographs, graphs. 11 ref. (Q3, J27, Al, Cu)

804-Q. Mechanical Twinning in Molybdenum. R. W. Cahn. *Institute of Metals, Journal,* v. 83, July 1955, p. 493-496 + 2 plates.

An investigation to find mechanical twins in molybdenum that have the same structure as iron and to apply complete crystallographic tests to establish firmly that they are twins. Diagrams, table, micrographs, photographs. 16 ref. (Q24, Mo)

805-Q. Cast Iron at Elevated Temperatures. *Iron & Steel,* v. 28, July 1955, p. 363-364.

An extensive survey of the literature and results of preliminary tests on 12 commercial cast irons. Tables, graphs. (Q general, CI)

806-Q. Residual Plastic Strains Produced by Single and Repeated Spherical Impact. J. A. Pope and A. K. Mohamed. *Iron and Steel Institute, Journal,* v. 180, July 1955, p. 285-297.

Investigation, theoretically and experimentally, of the maximum plastic strain and its penetration below the surface of a metal, resulting from single and repeated spherical impact. Variables studied were the velocity, energy and diameter of the indentor. Table, graphs, diagrams. 18 ref. (Q6, ST)

807-Q. Cermets—New High-Temperature Materials. Robert Steinitz. *Jet Propulsion,* v. 25, July 1955, p. 326-330.

Specific characteristics of cermets and the general requirements for high-temperature material. Diagrams, graphs, micrograph, photograph, table. 15 ref. (Q general, H general, SG-h)

808-Q. On the Buckling of Stringer Panels Including Forced Crippling. P. P. Bijlaard. *Journal of the Aeronautical Sciences,* v. 22, July 1955, p. 491-501.

Analysis considers the effective moment of inertia of the stiffeners when located on one side of the plate and the effective width of the plate at the unloaded edges, and the effects of shear deformation of the stiffener web and the flexibility of the attached flange of the stiffener. Diagrams, graphs, table. 12 ref. (Q28)

809-Q. Elastic Constants of Germanium Between 1.7° and 80° K. M. E. Fine. *Journal of Applied Physics,* v. 26, July 1955, p. 862-863.

The elastic constants as well as the Young's and shear moduli approach constant values for very low temperatures as the third law of thermodynamics requires. Table, graphs. 7 ref. (Q21, Ge)

810-Q. Condition of High-Velocity Ductile Fracture. E. Orowan. *Journal of Applied Physics,* v. 26, July 1955, p. 900-902.

Circumstances surrounding the fracture of a sheet of pure aluminum foil. Diagrams. (Q26, Al)

811-Q. Practical Design Aspects of Fatigue Limits. *Mechanical World and Engineering Record,* v. 135, July 1955, p. 294-297.

Comparison of fatigue limits of ferrous and nonferrous metals; effects of loading conditions. Graphs, photograph. (Q7)

812-Q. Magnetic Measurement of the Hardness of Metals. D. Hadfield. *Metal Treatment and Drop Forging,* v. 22, June 1955, p. 239-244.

Development of portable instrument for big-end steel bushes in motor-cycle engines and the results obtained. Photograph, table, diagram, graphs. 94 ref. (Q29, ST)

813-Q. Experimental Investigation of Shear Strength and Shear Deformation of Unstiffened Beams of 24 S-T Alclad With and Without Flanged Lightening Holes. Gunnar Anevi. *SAAB Aircraft Company, Technical Notes, SAAB TN* 29, 59 p.

Determination of shear intensity at failure and at commencement of permanent deformation and initial stiffness. Diagrams, tables, graphs, photographs. (Q2, Al)

814-Q. Transfer of Longitudinal Load From One Facing of a Sandwich Panel to the Other by Means of Shear in the Core. Charles B. Norris and Kenneth H. Boller. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1846, Apr. 1955, 30 p.

Determination of shear stresses in the core and direct stresses in the facings of a sandwich panel at points where the construction is changed or at the edge of the panel. Graphs, photographs, diagrams. (Q2, Q25)

815-Q. Shearing Effectiveness of Integral Stiffening. Robert F. Crawford and Charles Libove. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3443, June 1955, 37 p.

Values of coefficients for defining the effectiveness of integral stiffeners in resisting shear deformations of the plate of which they are an integral part presented for a wide range of proportions of rectangular stiffeners with circular fillets. Graphs, diagrams. 11 ref. (Q2, Q25)

816-Q. Preliminary Investigation of the Compressive Strength and Creep Lifetime of 2024-T3 (Formerly 24-S-T3) Aluminum-Alloy Plates at Elevated Temperatures. Eldon E. Mathauser and William D. Deveikis. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55E11b, June 1955, 12 p.

Testing of plates supported in V-grooves, comparison of tensile and compressive creep lifetime. Graphs. 4 ref. (Q3, Al)

817-Q. The Physical and Mechanical Properties of Beryllium Metal. D. W. Lillie. Paper from "The Metal Beryllium". American Society for Metals, p. 304-327.

Data on the properties which define and restrict the current utility of beryllium. Tables, graphs. 40 ref. (Q general, P general, Be)

818-Q. The Relation of Purity to Brittleness in Beryllium. A. R. Kaufmann. Paper from "The Metal Beryllium". American Society for Metals, p. 367-371.

Critical review of conclusions that impurities are not responsible for brittleness in the light of recent work which has shown that ductility exists in certain crystallographic directions in beryllium single crystals of nominal purity. Table. 3 ref. (Q23, Be)

819-Q. Ductility of Beryllium as Related to Single Crystal Deformation and Fracture. G. L. Tuer and A. R. Kaufmann. Paper from "The Metal Beryllium". American Society for Metals, p. 372-424.

Large single crystals can be prepared by direct solidification from the melt in a suitably shaped mold and under proper cooling conditions. The important aspects of the deformation and fracture processes are slip, twinning, kinking, deformation bands, deformation at room temperature, effect of temperature on deformation and fracture. Diagrams, photographs, tables, micrographs. 29 ref. (Q23, Q24, Be)

820-Q. Ductility of Beryllium as Related to Preferred Orientation and Grain Structure. J. L. Klein, V. G. Macres, D. H. Woodard and J. Greenspan. Paper from "The Metal Beryllium". American Society for Metals, p. 425-465.

Review of effect of fabrication variables on ductility of beryllium, study of metallurgical factors which affect room temperature ductility of beryllium and development of methods for producing beryllium rod and sheet which have much more ductility than previously considered possible for this metal. Diagrams, graphs, micrographs, tables, photograph. 10 ref. (Q23, Q24, M27, Be)

821-Q. (English.) Tensile Properties of Annealed Tantalum at Low Temperatures. J. H. Bechtold. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 249-254.

Yield strength increased to 125,000 psi at −195° C. but a brittle-type fracture developed in this range. Tables, graphs, diagram. 17 ref. (Q23, Ta)

822-Q. (English.) The Formation of Mechanical Twins. N. Thompson and M. Hingley. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 289-291.

Measurements of stress required to cause the appearance of twins in single crystals of cadmium, both in tension and in compression. Tables, diagram. 5 ref. (Q24, Cd)

823-Q. (English.) Double-Valued Internal Friction Behavior. H. K. Birnbaum. *Acta Metallurgica,* v. 3, no. 3, May 1955, p. 297-299.

Single crystals of sodium chloride, silver and aluminum relate type I (large hysteresis) and type II (small hysteresis) behavior. Graphs. 3 ref. (Q22, Ag, Al)

824-Q. (English.) The ΔE-Effect and Young's Modulus in Nickel-Cobalt Alloys. Mikio Yamamoto and Satoshi Taniguchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 1, Feb. 1955, p. 35-49.

Measurements in annealed nickel-cobalt alloys, covering the whole composition range, made at ordinary temperatures by the method of magnetostrictive vibration. Table, graphs. 22 ref. (Q21, P16, Ni, Co)

825-Q. (English.) On the Two Types of Kink Band in Aluminium Crystals. T. Ichiyama and M. Kurihara. *Technology Reports, Tohoku University,* v. 19, no. 2, 1955, p. 192-200.

Differences between the two types of deformation bands, namely, the kink band and the band of secondary slip. Diagrams, micrographs. 11 ref. (Q24, Al)

826-Q. (French.) Form of Tensile Curves of Refined Aluminum Monocrystals. Bernard Jaoul and Paul Lacombe. *Comptes rendus,* v. 240, no. 25, June 20, 1955, p. 2411-2413.

Properties of the point of inflection and the form of deformation curves with refined aluminum monocrystals of various orientations, prepared after machining by critical cold working. Diagrams. 6 ref. (Q27, Al)

827-Q. (French.) Lowering of the Yield Point of Annealed AG5 by a Second Annealing Following a Weak Deformation. M. Renouard and H. Stelljes. *Revue de métallurgie,* v. 52, no. 5, May 1955, p. 392-396.

After a brief deformation, followed by a nonrecrystallizing annealing, the yield point of some aluminum-magnesium alloys is lower than that obtained by a single annealing or by two consecutive annealings without intermediary deformation. Diagrams, graphs. 3 ref. (Q23, J23, Al, Mg)

828-Q. (French.) Failure of Working Pieces and Safety in Using Steels Functioning in Machine Parts. A. Fotiadi. *SIM—Documentation Métallurgique,* 1955, no. 21, Jan., Feb., Mar., p. 9-30.

Types of permanent deformation, cracks and failure due to fatigue, general behavior of steels under endurance conditions. Diagrams. (Q7, S21, ST)

829-Q. (German.) Characteristics and Applications of Microhardness. I. H. Bückle. *Metall,* v. 9, nos. 13-14, July 1955, p. 549-554.

Defines microhardness and shows errors in the determination technique. Table, graphs, diagrams. 36 ref. (Q29)

830-Q. (German.) Magnetic Investigation of Internal Stress of Carbon Steel Under Plastic Deformation. Ludwig Reimer. *Zeitschrift für angewandte Physik,* v. 7, no. 6, June 1955, p. 282-284.

Comparison of X-ray and magnetic methods of study; magnetization curve after plastic deformation and its dependence on the temperature of heat treatment. Graphs. 10 ref. (Q25, Q24, CN)

831-Q. (Italian.) Experimental Researches on the Anisotropy of Extruded Sections of High-Strength Light Alloys. F. Gatto and L. Mori. *Alluminio,* v. 24, no. 3, May 1955, p. 241-247.

Minimum mechanical strength corresponds to a 45° angle to the direction of extrusion, while the elongation attains its maximum value for the same angle; minimum resilience is found in cross grained test rods. Pattern of fracture undergoes gradual change, depending on the angle of the tested rod with the direction of extrusion. Diagrams, micrographs, tables, graphs. 5 ref. (Q23, EG-a)

832-Q. (Japanese.) The Effect of Tellurium Additions on Cast Iron. Bin-ichi Kawamura and Junzo Aono. *Metals (Japanese),* v. 25, no. 7, July 1955, p. 493-497.

Relation of hardness to the percentages of tellurium added to the molten iron and its effect on resulting microstructure. Photograph, micrographs, graphs, tables. (Q29, M27, CI, Te)

833-Q. (Polish.) The Effect of Aluminum Additions on the Annealing and Properties of Black-Heart Malleable Cast Iron From the Cupola. Jan Raczka. *Przeglad Odlewnictwa,* v. 4, no. 4, Apr. 1954, p. 99-104.

Effect of aluminum on cementite-pearlite transformations; hardness and strength during annealing at 950 and 710° C. Tables, micrographs, graphs. 6 ref. (Q29, Q23, J23, N8, Al, CI)

834-Q (Polish.) Substitute Alloys for the Tin Bronzes Used in Casting Production. Zbigniew Gorny and Krzysztof Rutkowski. *Przeglad Odlewnictwa,* v. 4, nos. 7-8, July-Aug. 1954, p. 196-205.

Necessity for economizing on tin and copper has led to the designing of special bronzes and brasses, with aluminum, iron, nickel and manganese contents; examples of tin-phosphorus, tin-zinc and tin-zinc-lead bronzes; strength, hardness and other tests. Tables, graphs, diagrams. (Q23, Q29, Cu)

835-Q. (Russian.) Study of the Strength of Connections of Main Girders of All-Welded Span Structures. D. I. Navrotskii. *Svarochnoe Proizvodstvo,* 1955, no. 7, July, p. 4-7.

Distribution of stresses, with static and vibration loads; effect of shape of connections. Diagrams, photographs, tables, graphs. 3 ref. (Q23, K1, ST)

836-Q. The Comparison of the Fatigue Characteristics of New and Used Crankshafts. J. L. Ciringione. *American Society of Mechanical Engineers, Paper No.* 55—OGP-5, 1955, 7 p. + 1 plate.

Effect on fatigue strength of various methods of reconditioning of worn crankshafts. Table, graphs, photographs. (Q7, CN)

837-Q. On the Loss of Texture in Tapes of a 50 Pct Ni-50 Pct Fe Alloy. S. Spachner and W. Rostoker. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Aug. 1955, p. 921-922.

Analyses of preferred orientations in tapes of various thicknesses. Effect of heat treatment on developed pole figures. Diffraction patterns, diagrams. 1 ref. (Q24, Fe, Ni)

838-Q. Some Optical Considerations in the Design of a Polariscope & in Photoelastic Stress Analysis. V. Cadambe and R. K. Kaul. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Feb. 1955, p. 41-50.

Optical design of a polariscope, steps required in measurement of fringe orders, errors and methods for their determination. Photographs, diagrams, circuit diagram. 8 ref. (Q25, S13)

839-Q. Impact Failure of Gear Teeth. Arthur J. Kauper. *Metal Progress,* v. 68, Aug. 1, 1955, p. 73-76.

Failure of transmission gear teeth was traced to variation in impact strength that followed the ingot pattern in the bar stock from which they were made. Photographs, graphs, diagrams. (Q6, ST)

840-Q. Fatigue of Aluminum Alloys. (Digest of "Fatigue of Aluminum", by R. L. Templin; presented at the Chicago Meeting of the American Society for Testing Materials, June 15, 1954.) *Metal Progress,* v. 68, Aug. 1, 1955, p. 170, 172, 174, 176.

Mechanism of fatigue failures; factors affecting fatigue strength. (Q7, Al)

841-Q. Fatigue Failure After Chromium Plating. (Digest of "Fatigue Cracking of Two Chromium-Plated Crankshafts". *British Engine Boiler and Electrical Insurance Co., Ltd., Technical Report,* v. 2, Sept. 1954, p. 165-177.) *Metal Progress,* v. 68, Aug. 1, 1955, p. 186, 188.

Chromium plating should not be used for parts which will be subjected to alternating stresses in service, unless the plating rate is slow, the deposits are very thin and the parts are heat treated above 570° F. after plating. (Q7, L17, ST, Cr)

842-Q. How to Curb Chrome-Plate Fatigue. J. E. Stareck, E. J. Seyb and A. C. Tulmello. *Steel,* v. 137, Aug. 8, 1955, p. 82-83.

This trouble, greater in high strength steels, is controlled by a new chromium plating process. Graphs. (Q9, L17, Cr)

843-Q. Wear Resistance of Steel Surfaces. V. V. Chernyshev. *Henry Brutcher Translation No.* 3450, 9 p. (Abridged from *Vestnik Mashinostroeniya,* v. 32, no. 9, 1952, p. 54-57.) Henry Brutcher, Altadena, Calif.

Study of wear of various steels at different sliding speeds and specific pressures between two cylindrical bodies, one of which is stationary, the other rotating. Tables, diagrams, photograph. 2 ref. (Q9, ST)

844-Q. Factors Affecting Directional Properties in Aluminum Wrought Products. Kent R. Van Horn. Paper from *American Society for Metals, Transactions,* v. 47, p. 38-76.

Rolling and recrystallization preferred orientation in aluminum alloy sheet; correlation of preferred orientation with directional properties. Graphs, tables, diagrams, photograph. 12 ref. (Q24, N5, Al)

845-Q. Application of Cottrell's Theory of Yielding to Delayed Yield in Steel. John C. Fisher. *American Society for Metals, Transactions,* v. 47, p. 451-462.

A simple analysis of the Cottrell yield point mechanism; quantitative description of the delayed-yield phenomenon as observed in steels by Clark and Wood. Diagram, graphs, table. 8 ref. (Q23, CN)

846-Q. The Effects of Twisting on Tungsten Wires at High Temperatures. Takeo Fukutomi. *American Society for Metals, Transactions,* v. 47, p. 599-604.

Sample wires were first twisted and then released after a definite time of heating. The ratios of the angle of free rotation after releasing to the angle of given torsion were measured at various temperatures. Diagram, graph. 5 ref. ((Q1, W)

847-Q. Delayed Failure and Hydrogen Embrittlement in Steel. R. P. Frohmberg, W. J. Barnett and A. R. Troiano. *American Society for Metals, Transactions,* v. 47, p. 892-925.

Delayed failure may occur over a wide range of relatively low applied stresses depending upon strength level, notch acuity and aging time after the introduction of hydrogen. The sensitivity to delayed failure may persist even though conventional tensile results indicate full ductility. The observed reductions in ductility are a function of both the depth of hydrogen penetration and the degree or severity of hydrogen embrittlement. Tables, graphs, photographs. 49 ref. (Q26, Q23, ST)

848-Q. Effects of Variation in Normalizing and Tempering Procedure on Stress-Rupture Strength, Creep Embrittlement and Notch Sensitivity for a Cr-Mo-V and a 17 Cr-4Ni-4Cu Steel. M. H. Jones, D. P. Newman, G. Sachs and W. F. Brown, Jr. *American Society for Metals, Transactions,* v. 47, p. 926-954; disc., p. 954-956.

Both notch sensitivity and smooth ductility, for both alloys, are greatly influenced by the heat treatment. High normalizing temperatures are particularly damaging to the ductility and the notch strength of the Cr-Mo-V steel. Tables, diagrams, graphs, micrographs. 15 ref. (Q4, Q23, AY)

849-Q. The Effect of Time and Temperature on Various Mechanical Properties During Strain Aging of Normalized Low Carbon Steels. F. Garofalo and G. V. Smith. *American Society for Metals, Transactions,* v. 47, p. 957-983.

Effect of aging time and temperature, after plastic straining in tension or compression, on the notch-impact transition temperature range, yield strength, tensile strength and hardness investigated for three low-carbon steels in normalized condition. Tables, graphs. 26 ref. (Q23, N7, CN)

850-Q. The Tensile Properties of Molybdenum at Elevated Temperatures. J. W. Pugh. *American Society for Metals, Transactions,* v. 47, p. 984-1001.

Analysis of the tensile properties as a function of temperature. It is concluded that the excellent high-temperature strength of this metal is due to strain aging. Tables, graphs, diagram, micrographs. 12 ref. (Q27, N7, Mo)

851-Q. Effect of Hydrogen on the Properties of Alloys. N. A. Galaktionova. *Henry Brutcher Translation No.* 3448, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 99, no. 3, 1954, p. 411-413.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 243-Q, 1955. (Q general, P general, CI, Ni, Al)

852-Q. (English.) **The Strains and the Energy in Thin Elastic Shells of Arbitrary Shape for Arbitrary Deformation.** Erich S. Weibel. *Zeitschrift für angewandte Mathematik und Physik,* v. 6, no. 3, May 1955, p. 153-189.

Fundamental equations of equilibrium and motion, methods for the solution of these equations for special cases. Diagrams, graph. 5 ref. (Q25, Q24)

853-Q. (French.) **Standardization of Tensile Specimen Procedure for the Chevenard Micromachine in the Examination of Cast Aluminum Alloy Pieces.** Claude Mascré. *Fonderie,* 1955, no. 113, June, p. 4551-4559.

Results of tests on standardization of Chevenard microspecimens and comparative study of these specimens. Diagrams, tables, micrographs. 4 ref. (Q27, Al)

854-Q. (German.) **On the Calculation of Strengths of Conical Bottoms.** R. Wahl. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 21, Ausgabe B, no. 3, 1955, p. 75-86.

A method of approximation for the calculation of stress distribution in conical bottoms which are annularly supported. Diagrams, graphs, photographs. 25 ref. (Q25)

855-Q. (English.) **The Yield Point in Single Crystal and Polycrystalline Metals.** A. H. Cottrell. Paper from "L'état solide". Institut International de Physique Solvay, p. 487-503; disc., p. 504-513.

Experimental and theoretical work. Effects of impurities on yield points of single crystals. Graphs. 41 ref. (Q23)

856-Q. (English.) **The Dynamics of Slip.** E. Orowan. Paper from "L'état solide". Institut International de Physique Solvay, p. 535-565; disc., p. 566-576.

Cause of the discrepancy between the calculated and observed values of the yield stress. Origin of dislocation mills, strain hardening. Diagrams. 32 ref. (Q24, N7)

857-Q. (French.) **The Elasticity of the Crystalline Medium.** Jean Laval. Paper from "L'état solide". Institut International de Phvsique Solvay, p. 273-312; disc., p. 313.

Mathematical analysis of the atomic theory of crystalline elasticity, excluding the hypothesis of central forces. 21 ref. (Q21)

858-Q. (Book.) **Strength of Materials. Pt. I. Elementary Theory and Problems.** S. Timoshenko. 3rd Ed. 442 p. 1955. D. Van Nostrand Co., Inc. 250 Fourth Ave., New York 3, N. Y. $6.50.

Considers tension and compression, stress-strain analysis, bending moment and shearing force, and strain energy and impact under various loading conditions as an approach to an increased correlation between the strength of materials and engineering design. (Q23)

R

Corrosion

307-R. Corrosion Aspects of Air Pollution. Leonard Greenburg and Morris B. Jacobs. *American Paint Journal,* v. 39, July 11, 1955, p. 64 + 7 pages.

Classification of atmospheres and their active corrosive agents; types of materials affected and their relative degree of resistance; effects of climatic conditions; bacterial deterioration. Tables. 15 ref. (R3)

308-R. The Use of Non-Ferrous Metals in Domestic Water Supply. Hector S. Campbell. *Chemistry & Industry,* 1955, no. 25, June 18, p. 692-698.

Performance of galvanized steel, lead, aluminum and copper pipes and tanks. 16 ref. (R4, CN, Pb, Al, Cu)

309-R. Corrosion in the Brewery. I. The Brewhouse. D. H. Edmonds. *Corrosion Prevention and Control,* v. 2, June 1955, p. 21-26.

Corrosive influences to be found in breweries, bottling stores and maltings; methods by which they are or may be controlled. Photographs. (To be continued.) (R7)

310-R. High Temperature Oxidation of Two Zirconium-Tin Alloys. M. W. Mallett and W. M. Albrecht. *Electrochemical Society, Journal,* v. 102, July 1955, p. 407-414.

Rate of oxidation of a zirconium alloy with 1.5 wt.% tin followed a cubic law in the temperature range from 600 to 900° C. at one atmosphere pressure, while the rate for an alloy with 2.5% tin followed a parabolic law in the range 550 to 900° C. The effect of tin in the zirconium increases the porosity of films and decreases the time before breakdown of the protective properties of the films. Tables, graphs, micrographs, diagram. 9 ref. (R2, Zr)

311-R. Dissolution of Metals in Aqueous Acid Solutions. I. Current-Potential Relations for Iron and Mild Steel. A. C. Makrides, N. M. Komodromos and Norman Hackerman. *Electrochemical Society, Journal,* v. 102, July 1955, p. 363-369.

Measurements of electrode potentials in hydrochloric acid alone and in hydrochloric acid solutions containing depolarizers discussed on basis of mixed-potential theory. Graphs. 18 ref. (R2)

312-R. The Rate and Mechanism of Dissolutions of Purest Aluminum in Hydrofluoric Acid. M. E. Straumanis and Y. N. Wang. *Electrochemical Society, Journal,* v. 102, July 1955, p. 382-386.

Tests to determine rate of dissolution of pure aluminum in hydrofluoric acid; effect of additions of ammonium fluoride and ammonium chloride on the dissolution rate. Table, graphs. 17 ref. (R2, R5, Al)

313-R. Mathematical Studies of Galvanic Corrosion. III. Semi-Infinite Coplanar Electrodes With Equal Constant Polarization Parameters. James T. Waber. *Electrochemical Society, Journal,* v. 102, July 1955, p. 420-429.

Mathematical analysis of a coplanar alternating array of long narrow electrodes was conducted subject to the limitation that polarization parameters for the anodes and cathodes are constant and equal. Diagrams, graphs, tables. 13 ref. (R1)

314-R. Cathodic Protection of Ships: Experience With Laid-Up Ships of Reserve Fleet. L. T. Carter and J. T. Crennell. *Engineering*, v. 179, June 3, 1955, p. 689-691.

Zinc protectors, wet sand-blasting, cathodic protection and paint, anode material and position, advantages of flame scaling. (R10)

315-R. The Pitting of an Aluminium Porringer by Copper-Contaminated Water. J. M. Bryan. *Journal of the Science of Food and Agriculture*, v. 6, June 1955, p. 305-311.

Investigation of rapid pitting of aluminum when in contact with water contaminated with copper and in the presence of salt. Tables. 4 ref. (R2, Al)

316-R. Human Body Fluids Affect Stainless Steel. Carl Andrew Zapffe. *Metal Progress*, v. 68, July 1955, p. 95-98.

It is shown that mechanochemical attack extends to the austenitic stainless steels, which have failed from stresses not exceeding the residual effects of cold working, and from corrodents and other products of human physiological processes. Micrographs. (R1, SS)

317-R. Cathodic Protection for Oil-Well Casing. J. P. Barrett and E. D. Gould. *Oil and Gas Journal*, v. 54, July 18, 1955, p. 90-91.

Types of attack, current requirements, results of cathodic protection, surface pipe effect and cost. Graphs. 4 ref. (R10)

318-R. Anodizing as a Means of Evaluating the Corrosion Resistance of Zirconium and Zirconium Alloys. R. D. Misch. *U. S. Atomic Energy Commission, ANL-5229*, 1953, 87 p.

Differences in anodic behavior correlated with corrosion resistance. Differences of zirconium were noticeable in rise of voltage with time at low current densities but indistinguishable in the relationship between interference colors and applied voltage. Diagrams, graphs, photographs, tables. 28 ref. (R11, Zr)

319-R. How to Reduce Corrosion in Production Operations. W. C. Koger. *World Oil*, v. 141, July 1955, p. 182 + 6 pages.

Use of cathodic protection to mitigate the corrosion problem has reduced maintenance expenses substantially. Graphs. (R10)

320-R. (French.) Reports of the Cebelcor Research Meeting, April 13-14, 1955. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 22, 1955, 80 p.

Activity and progress of research at the Belgium Corrosion Research Center on electrochemical behavior of metals, cathodic protection, scaling, direct aid to industry and international cooperation in research. Graphs, diagrams, photographs. (R general)

321-R. (French.) Application of Anticorrosive Protection to Condenser Tubes. A. J. Maurin. *Industrie Chimique Belge*, v. 20, no. 5, May 1955, p. 485-498.

Based on experience from salvage of tubes from 25,000 kw. condensers fed with polluted sea-water. Tables, graphs, diagrams. (R4, R10)

322-R. (French.) Rate of Dissolution of Titanium in Phosphoric Acid. T. G. Owe Berg. *Journal de chimie physique*, v. 52, no. 5, May 1955, p. 363-366.

Rate of dissolution of titanium in 6*N* to 28*N* phosphoric acid at 40, 50 and 60° C. is proportional to normality. Graphs. 3 ref. (R5, Ti)

323-R. (German.) Internal Stresses in Polyethylene Insulating Covers for Marine Cables. III. The Effect of Differential Cooling Temperature of Tube. W. Kortsch. *Kolloid-Zeitschrift*, v. 141, no. 3, May 1955, p. 160-165.

Effect of cooling temperatures on internal stresses and stress-corrosion. Tables, graphs, diagrams. 13 ref. (R1, Q25)

324-R. (German.) Microbes as a Cause of the Destruction of Bitumen Insulation. Th. Temme. *Bitumen, Teere, Asphalte, Peche*, v. 6, no. 5, May 1955, p. 161-164.

Microbic damage of corrosion-protective coatings and oxidation of hydrocarbons. Table, photographs. (R1)

325-R. (German.) Formation of Protective Layer and Steam Decomposition (Cracking) in Steel Pipes at High Temperatures. E. Ulrich. *Brennstoff-Wärme-Kraft*, v. 7, no. 6, June 1955, p. 241-248.

Decomposition of steam into oxygen and hydrogen at high temperatures and its influence of inside surface of steel pipes. The theory of the phenomenon. Diagram, graphs, tables. 12 ref. (R4)

326-R. (German.) Stress-Corrosion Phenomena in Highly-Stressed Steels Resulting From Diffused Hydrogen. I. Class. *Werkstoffe und Korrosion*, v. 6, no. 5, May 1955, p. 237-245.

Appearance of cracks of a predominantly transcrystalline character in ordinary and alloyed heat treated steels used in condensation units of high-pressure plants and experiments made to get these appearances under laboratory conditions. Photographs, diagrams, graphs. 13 ref. (R1, AY, ST)

327-R. (German.) Corrosion Inhibitors. Hellmuth Fischer. *Zeitschrift für. Metallkunde*, v. 46, no. 5, May 1955, p. 350-357.

Classification and mechanics of inhibitors; factors which influence the effect of inhibitors. Graphs, tables, diagrams. 21 ref. (R10)

328-R. (German.) The Problem of Stress-Corrosion of Homogeneous Solid Solutions. III. Dependence of Stress-Corrosion Sensitivity on Solid Copper-Gold and Silver-Gold Solutions on the Gold Content and Relationship to the "Solid-Solution Effect". Ludwig Graf and Jürgen Budke. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 378-385.

Effect of aqua regia, potassium cyanide solution, reagents which do not attack gold and mercury on stress corrosion of above solid solutions and on the change of strength properties under the influence of a liquid metal and chemical reagents. Graphs, tables. 20 ref. (R1, Cu, Ag, Au)

329-R. (German.) The Difference in Potential Within the Passive Layer of Iron. Klaus J. Vetter. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 3-4, June 1955, p. 165-174.

Theoretical and experimental determination of the potential difference at the oxide-electrolyte phase boundary; Flade potential and corrosion; possible effect of a high-energy oxide or of increased corrosion on the Flade potential. Diagram. 11 ref. (R10, Fe)

330-R. (German.) The Passivity of Iron in Neutral and Slightly Acid Solutions. K. G. Weil and K. F. Bonhoeffer. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 3-4, June 1955, p. 175-191.

Passivation of iron and its behavior in solutions varying from 2 to 6 pH. Graphs, tables, diagram. 11 ref. (R10)

331-R. (Italian.) Research on the Corrosion of Tin and on Its Protective Action on Iron. G. Bianchi. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 216-219.

Corrosion tests on tin and tin with steel in solutions of sulfuric, oxalic, tartaric, malic, citric and salicyclic acid, with and without additions of chlorides and sulfates; investigates tin-2% lead alloys. Graphs, photographs. 1 ref. (R5, Sn)

332-R. (Italian.) Some Observations on Evaluating the Corrosion Behavior of Tin-Plate. W. E. Hoare. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 220-221.

Tests on use of tin plate for packaging purposes. Photographs. 7 ref. (R general, T10, Sn)

333-R. (Russian.) Electrochemical Theory of Corrosion and Ways of Increasing the Corrosion Resistance of Alloys. N. D. Tomashov. *Uspekhi Khimii*, v. 24, no. 4, 1955, p. 453-470.

Effect of structural heterogeneity; circumstances under which passive state of metal appears; corrosion resistance increased by alloying with cathodic additions. Graphs, diagrams, tables. 41 ref. (R1, R10, ST, Cr, Cu, Ni, Zn, Al, Mn, Be, Mg)

334-R. Acid Contamination as a Source of Error in Boiling Nitric Acid Test for Corrosion-Resistant Steels. Robert J. Bendure. *ASTM Bulletin*, 1955, no. 207, July, p. 76-77.

High and erratic penetration rates obtained when testing area inadvertently contained hydrofluoric acid fumes. Tables. (R11, SS)

335-R. Corrosion Monitoring for Chemical Plant. C. Edeleanu. *Corrosion Technology*, v. 2, July 1955, p. 204-208.

Use of a simple valve voltmeter and a multipoint recorder or indicator to get continuous potential measurements. Anodic protection of equipment containing sulfuric acid. Graphs, diagrams, tables. 4 ref. (R6, R10)

336-R. The Corrosion Section of the British Iron and Steel Research Association. K. H. Gibbons. *Corrosion Technology*, v. 2, July 1955, p. 209-212.

Laboratory facilities and work in progress on atmospheres, soil and aqueous corrosion and protective coatings. Diagram, photographs. (R general, A9)

337-R. The Corrosion Resistance of Low-Alloy Steels. J. C. Hudson and J. F. Stanners. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 271-284 + 2 plates.

A systematic investigation of the effects of small amounts of alloying elements on the corrosion resistance of mild steel. Tables, diagrams, graphs, photographs. 6 ref. (R11, AY)

338-R. Corrosion in Nuclear Power Plants. *Mechanical Topics*, v. 16, no. 3, 1955, p. 2-4.

Requirements of materials to be used in nuclear power plants and the tests made to prove them satisfactory. Photographs, diagram, table. (R general, T25)

339-R. Corrosion of Beryllium in Air. James L. English. Paper from "The Metal Beryllium". American Society for Metals, p. 530-532.

Resistance of beryllium to corrosion at room temperature when in various worked forms, such as extrusions and machined specimens. (R3, Be)

340-R. Corrosion of Beryllium in Water. James L. English. Paper from "The Metal Beryllium". American Society for Metals, p. 533-548.

Aqueous corrosion of beryllium in

high-purity water systems at temperatures below 100° C. Effect of pH, temperature, dissolved gases, dissolved ions and corrosion control methods. Tables, graph. 22 ref. (R4, Be)

341-R. Corrosion of Beryllium in Liquid Metals. R. F. Koenig. Paper from "The Metal Beryllium". American Society for Metals, p. 549-554.

Results of corrosion tests of beryllium in liquid bismuth, bismuth-lead eutectic alloy, bismuth-lead-tin-eutectic alloy, gallium, lead, lithium, mercury and sodium. Tables, graph. 10 ref. (R6, Be)

342-R. (French.) **Electrochemical Behavior of Nickel. Voltage-pH Equilibrium Diagram of the Nickel Water System at 25° C. Corrosion of Nickel; Nickel Plating; Nickel Storage Batteries.** E. Deltombe, N. de Zoubov and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 23, June 1955, 28 p.

Electrochemical behavior of nickel studied by means of a voltage-pH equilibrium diagram. Conclusions drawn relative to corrosion, general properties of nickel and its oxides, electrochemical and chemical deposition, and to the functioning of nickel alkaline storage batteries. Tables, diagrams. 61 ref. (R1, Ni)

343-R. (German.) **Acid Resisting Steels in the Production of Wood-Vinegar.** L. Wetternik and H. Zitter. *Werkstoffe und Korrosion,* v. 6, no. 6, June 1955, p. 282-287.

Best results achieved by a steel alloyed with 27% chromium, 4 to 5% nickel, and 1 to 5% molybdenum. Diagram, graphs, tables. (R7, Cr, Ni, Mo, AY)

344-R. (Italian.) **Influence of Heating on Mechanical Properties and Corrosion Resistance of P-AG5.** D. Gualandi and G. Luft. *Alluminio,* v. 24, no. 3, May 1955, p. 229-240.

Heating of aluminum-magnesium alloy resulted in decreased resistance to corrosion under stress. Graphs, micrographs, tables, diagram. 14 ref. (R1, Q general, Al)

345-R. (Polish.) **Determination of Electrochemical Indexes of the Micro-Segregation in Metals.** Antoni Piotrowski. *Archiwum Gornictwa i Hutnictwa,* v. 2, no. 3, 1954, p. 373-415.

Investigation of the phenomenon of potential oscillation in "monometal" cells. Precise relation between the visible oscillations of the current seen in the curves and the microsegregation stated by the influence of homogenizing annealing of the test pieces. Graphs, diagrams, micrographs, tables. 27 ref. (R1)

346-R. (Russian.) **Electrode Potentials of Ternary Alloys Containing Intermetallic Compounds.** V. A. Iurkov and M. A. Krishtal. *Zhurnal Fizicheskoi Khimii,* v. 29, no. 5, May 1955, p. 778-780.

Measurements of electrode potentials of alloys provide data for predicting corrosion behavior. Micrographs, graph. 6 ref. (R1, Cd, Pb, Sb, Sn, Zn)

347-R. Cathodic Protection Installations at Kwinana. K. A. Spencer. *Corrosion Prevention and Control,* v. 2, July 1955, p. 23-27.

Protection of petroleum refining installations submerged in sea water. Photographs, diagrams. (R10)

348-R. Kinetics of Nickel-Sulfur and Steel-Sulfur Reactions. Andrew Dravnieks. *Electrochemical Society, Journal,* v. 102, Aug. 1955, p. 435-439.

Reaction of nickel with molten sulfur between 205 and 445° C. follows the parabolic law. The activation energy (Arrhenius) below approximately 300° C. is in excess of 50 kcal.; above this temperature, it is about 20 kcal. Graphs. 32 ref. (R6, P12, Ni, ST)

349-R. The Oxidation of Iron-Nickel Alloys. R. T. Foley, J. U. Druck and R. E. Fryxell. *Electrochemical Society, Journal,* v. 102, Aug. 1955, p. 440-445.

High-temperature (600 to 900° C.) oxidation of 42% nickel alloy. Reaction products examined by metallographic and electron diffraction techniques, as well as chemical analyses after stripping. Tables, graph, micrographs. 13 ref. (R2, Fe, Ni)

350-R. High Temperature Corrosion Rates of Several Metals With Nitric Oxide. Milton Farber, Alfred J. Darnell and Donald M. Ehrenberg. *Electrochemical Society, Journal,* v. 102, Aug. 1955, p. 446-453.

Corrosion rates determined for iron, tantalum, tungsten, molybdenum, nickel, copper, silver and the alloys Inconel and stainless steel. Tables, diagrams, graphs. 13 ref. (R9, Fe, Ta, W, Mo, Ni, Cu, Ag, Ni-e, SS)

351-R. High Pressure Oxidation of Metals. Oxidation of Metals Under Conditions of a Linear Temperature Increase. John P. Baur, Donald W. Bridges and W. Martin Fassell, Jr. *Electrochemical Society, Journal,* v. 102, Aug. 1955, p. 490-496.

Studies on tantalum, niobium, molybdenum, copper, zirconium, magnesium, titanium and tungsten to develop a method whereby oxidation behavior can be surveyed quickly and the pressure sensitive region found. Graphs, tables. 23 ref. (R2, Ta, Cb, Mo, Cu, Zr, Mg, Ti, W)

352-R. Controlling Corrosion With Cathodic Protection. H. R. Ludeker. *Metal Progress,* v. 68, Aug. 1, 1955, p. 86-90.

Corrosion, which costs our country billions of dollars each year, can be controlled by interposing an electrical resistance in the corrosion circuit or by limiting the difference in potentials of the anodic and cathodic areas. Photographs, diagram. (R10)

353-R. Corrosion of Stainless and Aluminum in Contact With Titanium. (Digest of "Corrosion of Stainless Steel and Aluminum Alloys in Contact With Titanium", by C. Braithwaite; *Royal Aircraft Establishment Technical Note Met.* 192, Feb. 1954, 11 p.) *Metal Progress,* v. 68, Aug. 1, 1955, p. 182, 184.

Tests by intermittent exposure to sea-water spray for one year. (R4, SS, Al, Ti)

354-R. Progress Report on Accelerated Corrosion Tests for the Performance of Plated Coatings. W. L. Pinner. *Plating,* v. 42, Aug. 1955, p. 1039-1043.

Report on work to furnish the metal finishing industry with a valid test which is reproducible and will predict service behavior of plated coatings. Photographs. 2 ref. (R11, L17)

355-R. The Oxidation of Metals. U. R. Evans. *Reviews of Pure and Applied Chemistry,* v. 5, Mar. 1955, p. 1-21.

Conditions determining oxidation, movement of vacancies, effect of minor constituents, cation or anion mobility, boundary reaction, tunnel effect mechanism and equations representing the effect of cavities or obstructions, and lateral growth. Graph. 64 ref. (R2)

356-R. (German.) **Corrosion and Corrosion Protection.** H. Mohler. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 21, no. 6, June 1955, p. 204-206.

Statistical analysis of corrosion damage on different materials; preventive methods. 6 ref. (R general)

357-R. (Pamphlet.) **The Use of Volatile Corrosion Inhibitors as a Preservative Medium for Long Term Storage of Ordnance Material. IV. Results After Five Years of Exposure.** PB 111608, 31 p. 1955. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Tests were conducted with ferrous and nonferrous ordnance items stored in three petrolatum-type preservatives or wrapped in papers impregnated with two volatile inhibitors. (R10)

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148-S. Improved Radiographs by Means of Tungstate Intensifying Screens. F. Goos and T. Maas. *Engineers' Digest,* v. 16, June 1955, p. 271-272, 298. (From *Schweissen und Schneiden,* v. 6, no. 11, Nov. 1954, p. 447-450.)

Results of tests limited to investigations of steel thicknesses not exceeding 40 mm. and voltages up to 150 kv. Graphs. (S13, ST)

149-S. How to Design Effective Experiments. Frank Proschan and Alfred B. Babcock, Jr. *Chemical Engineering,* v. 62, Aug. 1955, p. 191-198.

Statistical approaches, which can cut down on the number of runs needed, increase accuracy and save time in planning, conducting and interpreting complex experimental work in laboratory, plant or office. Tables. 5 ref. (S12)

150-S. Who Should Be Responsible for Quality Control? Kenneth M. Smith. *Foundry,* v. 83, July 1955, p. 125-127.

Suggestions on where responsibility for an effective quality control program should be placed in foundries of various size. Photograph. (S12, E general)

151-S. Quality Control Instrumentation. C. M. Gilmour. *Metal Industry,* v. 86, June 24, 1955, p. 529-532.

Use of radioactive isotopes and ultrasonics in measuring thickness and flaw detection. Table, diagrams, photographs. (S13, S14)

152-S. Temperature Measuring Instruments. Henry Barry. *Metal Industry,* v. 86, June 24, 1955, p. 537-539.

System used by Morgan Crucible Co., Ltd. in handling systematic maintenance, repair and inspection of their temperature measuring equipment. Photographs. (S16)

153-S. Tentative Standard H-Steels. *Metal Progress,* v. 68, July 1955, p. 104-B.

Translates into a simplified chart form the hardenability curves and data issued by the American Iron and Steel Institute. Graphs. (S22, J26, ST)

154-S. Pyrometry—Some Suggestions for Maintenance. Leo Walter. *Steel Processing,* v. 41, July 1955, p. 435-438.

High-temperature optical, radiation millivolt pyrometers, care of thermocouple instruments, maintenance and correct installation. Diagrams, photographs. (S16)

155-S. Work on Engineering Dimensional Metrology at The National Physical Laboratory. F. H. Rolt. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 1-17.

Research and testing of optical comparators, screw gages and flatness and straightness measurement. Diagrams, photographs. (S14)

156-S. Work on Engineering Dimensional Metrology at The Mechanical Engineering Research Laboratory. D. G. Sopwith. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 19-28.

Gaging methods in wear testing. Photographs, diagrams, map. (S14, Q9)

157-S. The Wear on Fixed Gauges and Means to Lessen or Eliminate Its Influence. Hilding Törnebohm. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 29-33; disc., p. 55-59.

Cost factors of wear tolerances of gages for grinding operations. Graph. 2 ref. (S14, Q9, G18)

158-S. Measurement in the Field of Interchangeable Manufacture by Gauges or Indicating Appliances. G. Berndt. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 35-55; disc., p. 55-59.

Validity of use of go and no-go gages; indicating instruments for shafts. Diagrams, photographs. 8 ref. (S14)

159-S. Inspection of Prismatic Bodies by Means of an Optical Section and Application of This Method to Turbine Blades. Jacques Turrettini. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 61-71.

Use of optical profile projectors. Diagrams, photographs. 1 ref. (S14)

160-S. A New Precision Internal Measuring Machine. C. O. Taylerson and A. Turner. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 73-79; disc., p. 79-80.

Instrument capable of measuring the diameters of cylindrical reference ring gages to an accuracy of ±0.00001 in. Photographs, diagrams. (S14)

161-S. Methods and Instruments for Thread Gauge Inspection. C. A. LeBourhis. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 81-95; disc., p. 108-109.

Comparison of efficiencies of various measuring machines. Photographs, diagrams. 1 ref. (S14)

162-S. Methods and Equipment of the Physikalisch-Technische Bundesanstalt for the Inspection of Thread Taper Gauges. K. Bürger and M. Gary. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 97-107; disc., p. 108-109.

Comparison of various gages; gage inspection procedures. Diagrams, photographs. 14 ref. (S14)

163-S. Organization and Use of Statistical Quality Control. M. Vercoutere. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 111-137; disc., p. 138-140.

Inspection procedures of a French plant manufacturing agricultural machinery and tractors. Graphs, diagrams, tables. 1 ref. (S12)

164-S. Statistical Techniques as Aids to Production Efficiency (The Role of Routine Inspection). B. P. Dudding. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 141-160; disc., p. 161-163.

Analysis of various inspection schemes in use in British plants. Graphs, photographs. 6 ref. (S12)

165-S. The Possibilities of Measuring Devices for Reducing Dispersion Factors. R. Yribarren. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 165-177; disc., p. 178.

Analysis of machine tool errors and gaging systems to counteract them. Diagrams. (S14, G17)

166-S. High-Speed Inspection of Turbine and Compressor Blades. J. Loxham. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 179-190; disc., p. 190-191.

Description and operation of semi-automatic equipment. Diagrams, photographs, tables. 1 ref. (S14)

167-S. Some Applications of Electronics to Industrial Dimensional Metrology. M. J. A. Chalvet. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 193-202; disc., p. 203-204.

Principles and operation of comparators. Diagrams. (S14)

168-S. A Review of Pneumatic Dimensional Gauges. Louis Polk. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 205-223; disc., p. 280-287.

Theory and operation of equipment for measuring dimensions in terms of the variations of pressure or flow in a pneumatic circuit. Diagrams, photographs. 26 ref. (S14)

169-S. The Pneumatic Method Applied to Dynamic Measurements. R. Yribarren. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 225-240; disc., p. 280-287.

Response characteristics and applications of pneumatic gages; examples of equipment for dynamic measurements. Diagrams, graphs, photographs, table. (S14)

170-S. A Pneumatic Gauging Method for Proving Rings. Kurt Hild. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 241-245; disc., p. 280-287.

Equipment and methods for measuring elastic deformation as a measure of effective force. Diagrams, photographs, graphs. (S14, Q21)

171-S. The Application of Pneumatic Gauging to Inspection Problems. F. R. Boosey. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 247-256; disc., p. 280-287.

Gaging principles and equipment; electric circuits; comparative efficiencies of pneumatic and other gages. Diagrams. (S14)

172-S. Pneumatic Gauging Instruments Developed at the National Physical Laboratory During Recent Years. J. C. Evans and I. G. Morgan. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 257-279; disc., p. 280-287.

Theory of size measurement, instruments for gaging yarns, wire and internal diameter. Graph, diagrams, photographs. 4 ref. (S14)

173-S. Machine Tool Metrology. D. F. Galloway. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 289-297; disc., p. 298-301.

Equipment and methods for checking machine tool alignments and fundamental movements. Photographs, diagrams, graph. (S14, G17)

174-S. Testing the Accuracy of Jig Boring Machines. T. R. Oakley. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 303-319; disc., p. 319-321.

Measuring equipment; alignment and flatness testing. Graphs, diagrams, photographs. (S14, G17)

175-S. Method of Recording the Pitch Errors of Screw-Cutting Lathes. F. H. Rolt. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 323-327; disc., p. 327-328.

Equipment by which lathes can be tested in the works and an autographic record obtained showing the complete periodic and progressive errors over any length of traverse required. Diagrams, graph. (S14, G17)

176-S. Apparatus for Demonstrating Errors in Movements of Machine Tool Slides. F. H. Rolt and W. F. Atkins. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. I, p. 347; disc., p. 347-348.

Equipment and methods for measuring straightness and flatness. Diagram. (S14, G17)

177-S. Recent Developments in Gear Metrology. C. Timms. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 349-358; disc., p. 404-413.

Equipment and methods for measuring tooth profile, spacing errors and alignment. Photographs, table, graphs, diagram. (S14)

178-S. Recent Developments in Rolling Gear Testers. J. A. Horne. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 379-404; disc., p. 404-413.

Range and accuracy of instruments for determination of backlash and eccentricity and smoothness of tooth action. Diagrams, photographs, graphs. 3 ref. (S14)

179-S. Metrology in the Horological Industry. K. H. Hume. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 455-465; disc., p. 466-467.

Measuring equipment and procedures associated with the manufacture of instruments, clocks and watches. Photographs, diagram. 3 ref. (S14)

180-S. Small Screw Threads. P. R. Brierley. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 469-482; disc., p. 482-483.

National and international systems; thread forms; measuring techniques. Table, graphs, diagrams. (S14)

181-S. The Precise Establishment of Long Co-Ordinates in Factories. O. S. Reading. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 485-488, 490-493; disc., p. 488-489.

Optical methods for avoiding flexure errors in large-sized jigs for defining straight lines. Photographs, diagram. (S14)

182-S. Report on the Measurement of Large Work-Pieces, Measuring Equipment, Systems of Fits Over 500 Mm. N. N. Sawin. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 495-526; disc., p. 583-588.

Wear and margins of error of fixed gap gages. Pin, internal and projecting hook gages. Diagrams, tables, photographs. 9 ref. (S14)

184-S. Report on an Investigation for the British Standards Institution Into the Accuracy With Which Industry Measures Large Dimensions. P. W. Harrison. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 527-536; disc., p. 583-588.

Degree of accuracy of measurements made in engineering workshops with particular reference to large work-pieces up to nearly 80 in. in size. Diagrams, graphs, table. (S14)

185-S. Some Problems of Large-Scale Measurement in the Heavy Electrical Industry. T. P. Jolly. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 537-561; disc., p. 583-588.

Description and use of shop length gages, telescopic point gages, diameter - measuring instruments. Photographs, diagrams, graphs, tables. (S14)

186-S. Large Scale Metrology. V. B. Hessen. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 563-576; disc., p. 583-588.

Instrumentation and measuring system for positioning equipment components over distances up to 30 ft. Description and principle of application of a Tape Gage, which allows repeated measurements over a predetermined length to an accuracy of ±0.003 in. up to a maximum of 20 ft. Diagrams, table. (S14)

187-S. A New Method for Checking the Profile of Large Marine Propellers. P. W. Harrison and H. C. Garlick. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 577-582; disc., p. 583-588.

Measuring techniques for determining accuracy of form of ship propellers. Diagrams, photographs, table, graph. (S14)

188-S. Microgeometric Testing of Surfaces. A. Mirau. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 589-598; disc., p. 651-664.

Methods used in France for testing the finish of surfaces by interferometric, pneumatic and optical methods. Diagrams, photographs, micrographs, graph. (S15)

189-S. The Trend of Surface Measurement. R. E. Reason. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 599-620; disc., p. 651-664.

Equipment and methods to measure errors of straightness, wavyness or roundness; profile comparators. Flowsheet, diagrams, graphs, photographs, table. 9 ref. (S15)

190-S. Two Recent Developments for Accurate Measurement of Surface Roughness. A. F. Underwood. Paper from "Engineering Dimensional Metrology". Her Majesty's Stationery Office, v. II, p. 621-628; disc., p. 651-664.

Development of a roughness standard which could be used to check and calibrate any stylus-type surface roughness measuring device. Design of electronic surface measuring instrument. Photographs, graph, diagrams. 2 ref. (S15)

191-S. (Dutch.) **Echo-Impulse Method Very Suitable for the Investigation of Difficult Materials.** T. van der Klis. *Bedrijf en Techniek*, v. 10, no. 228; *Electronica section*, v. 8, no. 175, May 21, 1955, p. 81-83.

Principle and design of testing device; its uses in detecting defects and measuring thicknesses. Diagrams, photograph. (S13)

192-S. (Dutch.) **Measuring the Thicknesses of Materials.** R. Smit. *Bedrijf en Techniek*, v. 10, no. 229; *Electronica section*, v. 8, no. 176, June 4, 1955, p. 89-92.

Design and operation of X-ray, beta-ray and gamma-ray thickness meters. Diagrams, graph. 8 ref. (S14)

193-S. (French.) **Study of the Weight of Sheets.** Jolin. *Centre de Documentation Sidérurgique Circulaire d'Informations Techniques* v. 12, no. 5, 1955, p. 1031-1043.

Determination of the weight variation of a sheet or batch of sheets in relation to the theoretical weight corresponding to the nominal thickness. Graphs, tables. (S14)

194-S. (French.) **Industrial Control by Ultrasonics.** Jean Daurat. *Métallurgie et la construction mécanique*, v. 87, no. 5, May 1955, p. 379, 381, 383, 385.

Cast barium titanate ceramics; correlating mechanical - resonance and shearing tests; control of brazed contacts. Micrographs, tables, graphs. (S13)

195-S. (German.) **A Process of Measuring Constant Magnetic Fields and Constant-Field Differences and Its Application in the Research and Technology of Metals.** Friedrich Föster. *Zeitschrift für Metallkunde*, v. 46, no. 5, May 1955, p. 358-370.

Principle of operation and design of precision-field strength meter and its uses in geophysics, nondestructive testing, sorting, electrochemical and electrical engineering. Graphs, diagrams, photographs. 20 ref. (S13, S10)

196-S. (Norwegian.) **Methods and Instruments for Measuring Technical Surfaces.** Sivilingenir Chr. Kjoergaard Nissen. *Teknisk Ukeblad*, v. 102, no. 21, May 26, 1955, p. 435-439.

Different optical and interference methods of evaluating surface condition. Diagrams, micrographs, photographs. (To be continued.) (S15)

197-S. (Norwegian.) **Methods and Instruments for Measuring Surfaces.** Kjoergaard Nissen. *Teknisk Ukeblad*, v. 102, no. 22, June 2, 1955, p. 463-469.

Methods and devices for determining the surface roughness and surface texture of different materials. Diagrams, graphs, photograph. 8 ref. (S15)

198-S. (Polish.) **The Significance of Microstructural Examination in Metallurgical Investigations.** W. Haczewski, Z. Wojcik and J. Ogerman. *Prace Instytutow Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 179-182 + 4 plates.

Causes of premature deterioration of railroad rails, cracking of carburized alloy steel gears and deep drawing failures of low carbon steel sheet products. Micrographs, graphs, photographs, diagrams. (S21, M27, AY, CN)

199-S. (Polish.) **Spectral Analysis.** W. Klimecki. *Prace Instytutow Ministerstwa Hutnictwa*, v. 7, nos. 2-4, 1955, p. 183-202 + 1 plate.

Steeloscopic, spectrographic and direct spectrometric analytical procedures for major elements of steels, high alloy steels, cast iron, Silumins and lithium in carnallites. Graphs, photographs, tables, 27 ref. (S11, ST, AY, CI, Al)

200-S. (Polish.) **State of Standardization in Metallurgy. Standards of Non-Ferrous Metals.** Marian Sadtowski. *Wiadomosci Hutnicze*, v. 11, no. 6, June 1955, p. 170-173.

Comparison of standards for pressed, rolled, drawn, extruded nonferrous sheets, rods, pipes, etc., for refractory materials, and for methods of investigation. Table. (S22)

201-S. Production Control of Quality Steels. Robert W. Graham. *American Iron and Steel Institute, Preprint*, 1955, 23 p.

Analysis of variables in steelmaking and fabrication; control of composition of steels; quality control measures. Photographs, graphs. (S12, S18, D general, ST)

202-S. The Rapid Determination of Cadmium in Plating Solutions. Frank J. Versagi. *Finish*, v. 12, Aug. 1955, p. 29, 51.

Equipment, procedures and materials for polarographic method. Graph. (S11, L17, Cd)

203-S. Industrial Uses of Special-Purpose Computers. A. H. Kuhnel. *Instruments and Automation*, v. 28, July 1955, p. 1108-1113.

Examples for control of a punch machine requiring computed numbers of various gage pieces, control of a milling machine for contour milling of turbine blades, and a special-purpose data processor; Analysis and design of the computer approach. Photographs, diagrams. (S general, G17)

204-S. Process Control Analysis. VI. Analytic Solutions. Millard H. Lajoy and E. Allen Baillif. *Instruments and Automation*, v. 28, July 1955, p. 1114-1118.

For many types of controlled systems, the defining equations are ordinary, linear, and of low order—and have constant coefficients. Conventional analytic solutions of these equations, practical examples. Diagrams. (To be continued.) (S18, S12)

205-S. Ultrasonic Test Detects Enlarged Grains in Some Steel Parts. R. N. Hafemeister. *Iron Age*, v. 176, July 21, 1955, p. 95-97.

Nondestructive ultrasonic testing can detect grossly coarsened grain structure in some finish machined steel parts. Such coarsening, often a result of overheating in heat treatment, can be a factor in service failure. Photographs, micrographs, table. (S13, ST)

206-S. Non-Destructive Testing. II. Ultrasonic Testing. J. M. McLeod. *Iron & Steel*, v. 28, July 1955, p. 339-343.

Importance of shape and orientation of the flaw, grain size, single and double crystal method and surface condition; the use of shear waves, immersed scanning, shadow graph and resonance methods. Applications and acceptance standards. 48 ref. (S13)

207-S. A Furnace Scanning Periscope. Charles Burns. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 241-247 + 4 plates.

Development of a water-cooled periscope which can be inserted in an openhearth furnace and give an effective viewpoint within the furnace walls. It can be used for still or ciné photography (normal or high-speed) or for direct visual observation. Diagrams, photographs. (S16, D2)

208-S. Open-Hearth Immersion Pyrometers. A. Goodall. *Iron and Steel Institute, Journal*, v. 180, July 1955, p. 247-254.

Review of development through three principal designs; reasons for changes; costs calculated; lines of future development suggested. Tables, diagrams, photographs. 3 ref. (S16, D2)

209-S. Surface Micro-Interferometry. J. W. Perry. *Research*, v. 8, July 1955, p. 255-261.

Survey of the evolution of interferometers on a functional basis, from the simplest unaided-vision forms to the most recent micro-

interferometer developments. Graph, diagrams, photographs. 13 ref. (S15)

210-S. Standards for Sheet, Strip and Plate in Aluminium and Its Alloys. H. M. Bigford and E. Elliott. *Sheet Metal Industries,* v. 32, no. 339, July 1955, p. 491-494; disc., p. 494-496.

Efficacy of British standards; variations of properties within standard limits and their effects on manufactured products. Table. (S22, Al)

211-S. The Radiography of Spot Welds in Light Alloy Sheets. N. K. Gardner and E. A. Redwood. *Welding and Metal Fabrication,* v. 23, July 1955, p. 245-249.

Physical examination of the method, equipment, radiographic technique, interpretation of radiographs and costs. Graphs, photographs, radiographs. 2 ref. (S13, K3)

212-S. Analytical Chemistry of Beryllium. Clement J. Rodden and Frank A. Vinci. Paper from "The Metal Beryllium". American Society for Metals, p. 641-691.

Presents, in an orientative manner, some of the adopted methods currently used in the beryllium industry. Diagrams, graph, table, photograph. 67 ref. (S11, Be)

213-S. Statistical Control in Metal-Working Operations. M. Whyte. Paper from "The Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. Pt. II. The Control of Quality in Working Operations". Institute of Metals Monograph and Report Series No. 16, p. 58-68.

Selection, control and sensitivity of routine test. Applications to specific problems. Graphs. 17 ref. (S12)

214-S. (Czech.) Using Radioisotopes for the Noncontacting Measurement of Rolling Materials. Jan Petr. *Hutnické Listy,* v. 10, no. 6, June 1955, p. 346-352.

Summarizes methods of the noncontacting measurement, advantages of method using radioisotopes, especially, the use of pure beta-ray sources for thickness of thin sheets and foils. Graph. 11 ref. (S14, F23)

215-S. (French.) Controlling the Quality of Radiographic Images in the Examination of Welds. C. Brachet. *Soudage et Techniques connexes,* v. 9, nos. 5-6, May-June 1955, p. 131-139; disc., p. 139-140.

Results of comparative tests conducted on different types of penetrometers. Diagrams, table, radiographs. (S13, K9)

216-S. (Russian.) Magnetographic Method of Controlling the Quality of Welded Joints. A. S. Fal'kevich, F. I. Kisliuk, Iu. V. Usenko and V. M. Lubov. *Svarochnoe Proisvodstvo,* 1955, no. 7, July, p. 10-12.

Description and operation of equipment for detection of defects. Photographs, diagrams, graphs. (S13, K9)

217-S. Non-Destructive Testing. I. Surface Condition. J. M. McLeod. *Iron & Steel,* v. 28, June 1955, p. 301-306, 318.

Tests for surface hardness and the detection of surface flaws by the penetrating liquid methods and magnetic particle tests. 85 ref. (S13, Q29)

218-S. Production Control of Quality Steels. I-II. R. W. Graham. *Steel,* v. 137, Aug. 8, 1955, p. 78-79; Aug. 15, 1955, p. 142, 145.

Depicts industrial demand for precise quality control and importance of operating personnel in the program. Photographs, graphs. (S12, ST)

219-S. Use of Spectroanalysis in the Rapid Control Laboratory of a Steel Works. G. Hartleif and H. Kornfeld. *Henry Brutcher Translation No.* 3458, 12 p. (Abridged from *Stahl und Eisen,* v. 75, no. 9, 1955, p. 587-590.) Henry Brutcher, Altadena, Calif.

Adaptation of high-speed spectroanalytical procedures for Al, Cr, Cu, Cb, Mo, Si, Ni and V to the equipment normally available in German routine analysis rapid-control laboratories. Tables, graphs, diagram. 5 ref. (S11, Al, Cb, Cr, Cu, Mo, Ni, Si, V)

220-S. Problems of the Control of Dimension, Shape, and Finish in the Rolling of Sheet and Strip and in the Drawing of Wire. Hugh Ford and J. G. Wistreich. Paper from "The Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. Pt. II. The Control of Quality in Working Operations". Institute of Metals Monograph and Report Series No. 16, p. 5-14 + 1 plate.

Definition of the property and methods for measurement; causes of variation of the property and methods of control; technical and economic appraisal of possible methods of control, with reference to tolerated variations. Tables, diagrams, micrographs. 21 ref. (S14, S15, F23, F28)

221-S. (French.) The Two-Color Pyrometer. P. Rodicq and G. Maillot. *Revue de métallurgie,* v. 52, no. 6, June 1955, p. 477-484.

Manner in which study was conducted indicates reliability of apparatus; results obtained. Diagrams, photographs, graphs. (S16)

222-S. (French.) Methods for the Determination of Dust Content in the Blast Furnace Gas. C. G. Thibaut, D. Sanna and F. Douez. *Revue de métallurgie,* v. 52, no. 6, June 1955, p. 485-507.

Measurement can be carried out with an approximation of 5% in the whole range of common concentrations from a few mg. per cu. m., in the purified gas, to 100 g. per cu.m., in the raw gas. Diagrams, tables, graphs. (S11, D1)

223-S. (Norwegian.) Use of Radioactive Isotopes in Metallurgy. Ulf Been. *Tidskrift för Kjemi Bergvesen og Metallurgi,* v. 15, no. 6, 1955, p. 104-106.

Radioactive isotopes as aids in the study of diffusion, vapor pressure, microstructure, friction, wear, lubrication and the various problems of process metallurgy and radiography. (S19)

224-S. (Russian.) Spectral Analysis of Slags. N. V. Buianov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 19, no. 1, Jan.-Feb. 1955, p. 89-93.

Equipment and methods; comparison with other analytical methods. Tables. 30 ref. (S11, B21)

225-S. (Russian.) Spectrochemical Methods for the Analysis of Open-Hearth Slags for All Basic Components. O. I. Nikitina. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 19, no. 1, Jan.-Feb. 1955, p. 94-96.

Analysis of solid and dissolved slags. Tables. (S11, B21, D2)

226-S. (Book.) Engineering Dimensional Metrology. v. I-II. 689 p., 1955. Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2, England. £2 5s 0d.

Thirty-nine papers which were presented at a symposium at the National Physical Laboratory, Teddington, England, from Oct. 21-24, 1953. Pertinent papers are separately abstracted. (S14)

T Applications of Metals in Equipment

97-T. Characteristics and Calibration of Bimetal Releases and Relays. H. Haas. *Engineers' Digest,* v. 16, June, 1955, p. 281-284. (From *Siemens Zeitschrift,* v. 29, no. 2, Feb. 1955, p. 61-68.)

Operating characteristics, effect of working temperature, influence of ambient temperature, calibration of bimetal relays and types of material used in bimetallic releases. Graphs. (T1)

98-T. High-Strength Steel—Aircraft Requirements. Leo Schapiro. *Metal Progress,* v. 68, July 1955, p. 77.

Need for new composition or better processing methods to meet aircraft requirements. (T24, ST)

99-T. High-Strength Steel—Present Limitations. Paul M. Mozley. *Metal Progress,* v. 68, July 1955, p. 78-80.

Limitations on cleaning, plating and surface conditioning as an illustration of the problems encountered in the use of steel heat treated to high strengths. (T24, ST)

100-T. Titanium Fasteners. Thomas F. Spoehr. *Metal Progress,* v. 68, July 1955, p. 80-81.

Problems involved in the production of titanium bolts to be used in the aircraft industry. Photograph. (T7, T24, Ti)

101-T. Automation in Welding Rod Manufacture. E. C. Wright. *Metal Progress,* v. 68, July 1955, p. 116-118.

Automatic equipment speeds up production, overhead construction of baking ovens saves floor space. Photographs. (T5)

102-T. Aluminum in Electronic Equipment. E. A. Farrell. *Modern Metals,* v. 11, July 1955, p. 35 + 6 pages.

Applications in electrical and electronic components and structures. Photographs. (T1, Al)

103-T. The Use of Indium in High-Vacuum Equipment. F. L. Reynolds. *U. S. Atomic Energy Commission* UCRL-2989, May 1955, 4 p.

The use of indium and indium-coated copper as gasket materials. A simple yet novel valve employing indium that does not use organic materials as vacuum seal. Diagrams. (T7, In)

104-T. (German.) Directions for the Substitution of Steel and Heavy Nonferrous Alloy Castings by Aluminum Castings. Hermann Kessler. *Giesserei,* v. 42, no. 12, June 9, 1955, p. 307-309.

Advantages of aluminum castings. Chemical, physical and mechanical properties of cast aluminum alloys as a main factor in selecting fields of substitution. Tables. 4 ref. (T general, Al)

105-T. Use of Galvanized Sheets in Concrete Reinforcement. Irwin A. Benjamin. *American Iron and Steel Institute, Preprint,* 1955, 20 p.

Investigation of the bond of galvanized sheets to portland cement concrete to establish practical uses that could be made of high-tensile corrugated galvanized sheets in the construction industry. Graphs, tables, photographs. 5 ref. (T26, ST)

106-T. Raw Materials in the Automotive Industry. J. S. Anderson.

Australasian Engineer, 1955, May, p. 60-71.

Detailed survey of materials, with reference to specific applications; requirements of Australian automobile industry. Tables, graph. (T21)

107-T. Some Aspects of Modern Aircraft Materials. H. Sutton. *Royal Aeronautical Society, Journal,* v. 59, July 1955, p. 494-501.

Properties, applications and fabrication of steels and light alloys. Tables, graphs. 14 ref. (T24, S1, EG-a)

108-T. Lighter Autos Down the Road. Leo Swoboda. *Steel,* v. 137, July 18, 1955, p. 106-107.

Use of aluminum in brake drums, trim, radiators, flywheel housings, doors and many other parts. Photograph. (T21, Al)

109-T. The Role of Beryllium in the Atomic Energy Program. Robert E. Pahler. Paper from "The Metal Beryllium". American Society for Metals, p. 14-23.

Applications in nuclear reactors, role of AEC in beryllium production, cost reduction, availability in the U. S. Table, diagram, photographs. 6 ref. (T25, Be)

110-T. The Role of Beryllium in Industry. N. W. Bass. Paper from "The Metal Beryllium". American Society for Metals, p. 24-41.

Applications, beryllium metals, oxides, other beryllium compounds and beryllium as an alloying element. Tables. 13 ref. (T general, Be)

111-T. (French.) **High-Strength Cast Irons Without Special Elements.** J. Pascal. *Métallurgie et la construction mécanique,* v. 87, no. 6, June 1955, p. 479 + 4 pages.

Field of application, composition of cast irons for particular requirement of cast machine parts. Tables, diagrams, graphs, micrographs. 52 ref. (T7, CI)

112-T. (Swedish.) **Heat-Treatable Hard-Alloy Welding Electrodes for High Speed Tools.** Tore Norén. *Svetsaren,* v. 19, no. 4, 1954, p. 8-14.

Physical and mechanical properties, crystal structure and composition, method of heat treatment, field of application. Graphs, micrographs, photographs. 7 ref. (T5, K1, TS)

113-T. New Powdered Material Reduces Bearing Wear. Stanley Hodge. *Iron Age,* v. 176, Aug. 11, 1955, p. 87-89.

Micro-sized particles of a copper-lead mixture, added to the regular machine lubricant, recondition bearings while the machines run. Other uses for the powdered metal mixture include coolant additions for longer tool life and to reduce wear in hydraulic valves. Photographs. (T7, G21, Cu, Pb)

114-T. Switch to Aluminum Overcomes Design Problems. S. S. Stenersen. *Iron Age,* v. 176, Aug. 11, 1955, p. 98-99.

Use of aluminum end frames results in elimination of eddy currents and lighter weight. Photograph, diagrams, table. (T1, Al)

115-T. Applications of Arc-Cast Molybdenum. N. L. Deuble. *Metal Progress,* v. 68, Aug. 1, 1955, p. 77-79.

Molybdenum is currently going into production of magnetron tubes and glass melting furnaces; nearing commercial applications are piercer points for the tubing industry, die casting dies, ramjet nozzles and gas-turbine parts. Photographs. (T general, Mo)

116-T. Teflon-Impregnated Bearings for Service in Water. H. B. Nudelman and Cord H. Sump. *Metal Progress,* v. 68, Aug. 1, 1955, p. 112-113.

Porous stainless steel bearings impregnated with Teflon are recommended for service where hot water is used for lubrication. Photographs. (T7, SS)

117-T. Aluminum Pistons—A New Approach. C. G. A. Rosen. *Railway Locomotives and Cars,* v. 129, Aug. 1955, p. 64-68.

Application to diesel locomotives requires special design and treatment to avoid ring groove wear. Graphs, diagrams, photographs. (T7, T23, Al)

118-T. A Guide to Bearing and Bushing Choice. I. Bearing Materials. II. Picking the Right Bearing. J. B. Mohler. *Steel,* v. 137, Aug. 1, 1955, p. 76-78; Aug. 8, 1955, p. 88-89.

Provides and tabulates necessary data. Tables, photographs. (T7, SG-c)

119-T. (French.) **Cast Metals in Military-Naval Construction and Particularly in the Construction of Propulsive Apparatuses. Conditions for Their Examination and Acceptance.** Jean Tigeot. *Fonderie,* 1955, no. 113, June, p. 4543-4550.

Alloys used in military-naval construction, necessary qualities of different pieces, gamma-ray radiographic testing. Diagrams, radiographs. 4 ref. (T22, T25, T2, S13)

120-T. (French.) **Platinum Metals in Electrical Engineering, Dentistry, and the Jewelry Industry.** K. Ruthardt. *Revue de métallurgie,* v. 52, no. 6, June 1955, p. 441-446.

Importance of platinum, palladium and rhodium in the pure and alloyed state. Photographs, tables. (T1, T9, T10, Pd, Rh, Pt)

V

Materials
General Coverage of Specific Materials

187-V. Aluminum 5086. High Strength Wrought Aluminum Alloy. *Alloy Digest,* no. Al-28, July 1955.

Composition, physical constants, mechanical and physical properties, fabrication, forms available and applications. Tables. (Al)

188-V. Alar 00.5. Aluminum Casting Alloy. *Alloy Digest,* no. Al-29, July 1955.

Composition, physical constants, mechanical and physical properties, fabrication, forms available and applications. Tables. (Al)

189-V. NI-Resist. Heat & Corrosion Resistant Cast Iron. *Alloy Digest,* no. CI-11, July 1955.

Composition, physical constants, mechanical and physical properties, fabrication, forms available and applications. Tables. (SG-h, CI)

190-V. Cupaloy. High Conductivity Copper Alloy. *Alloy Digest,* no. Cu-28, July 1955.

Composition, physical constants, mechanical and physical properties, general characteristics, forms available and applications. Tables. (Cu)

191-V. Elektron Zreo. Creep Resistant Magnesium Alloy. *Alloy Digest,* no. Mg-18, July 1955

Composition, physical constants, mechanical and physical properties, fabrication, surface treatment, forms available and applications. Tables. (Mg)

192-V. U. S. S. Man-Ten. High Strength Steel. *Alloy Digest,* no. SA-31, July 1955.

Composition, mechanical and physical properties, fabrication, forms available and applications. Tables. (AY)

193-V. Armco 25-12. Heat Resistant Steel, Types 309 & 309S. *Alloy Digest,* no. SS-32, July 1955.

Composition, physical constants, mechanical and physical properties, fabrication, forms available and applications. Tables. (SS)

194-V. Electrite CO-6. Cobalt High-Speed Steel, Type M36. *Alloy Digest,* no. TS-35, July 1955.

Composition, physical constants, mechanical and physical properties, forms available and applications. Tables. (TS)

195-V. Development and Application of Tool Steels. I. B. M. Hamilton. *Canadian Metals,* v. 18, July 1955, p. 39-41.

A review of the early development and applications and the advantages and disadvantages of their use today. Graph, micrographs. (To be continued.) (TS)

196-V. Spring Materials. *ISA Journal,* v. 2, July 1955, p. 257-260.

Data sheets on glossary of terms, alloys, properties and applications. Table, graph. (SG-b)

197-V. Recent Aluminium Casting Developments. L. Fletcher. *Metal Industry,* v. 87, July 8, 1955, p. 23-27.

Alloys, applications, properties and foundry techniques. Photographs. (Al)

198-V. Rem-Cru A-110AT. *Rem-Cru Titanium Data Sheet,* 1955, June 1, 8 p.

Alloy design, applications, forms available, physical and mechanical properties, corrosion resistance, fabricating, heat treating and welding. Tables, graphs. (Ti)

199-V. (French.) **High Strength Cast Irons Without Special Elements.** J. Pascal. *Métallurgie et la construction mécanique,* v. 87, no. 5, May 1955, p. 369, 371, 373, 375.

Properties and production of high-strength pearlitic cast iron. Graphs. (To be continued.) (CI)

200-V. (German.) **Most Recent Developments in Magnesium.** Charles E. Nelson. *Zeitschrift für Metallkunde,* v. 46, no. 5, May 1955, p. 338-349.

Production and properties of magnesium and its alloys; methods of melting, casting, alloying, processing and welding; uses in industry. Flowsheet, tables, graphs, micrographs, photographs, diagram. 8 ref. (Mg)

201-V. Commercially Pure Iron. E. N. Simons. *Canadian Mining Journal,* v. 76, July 1955, p. 66-67.

Advantages and properties of high-purity iron, production methods, necessary precautions in fabrication procedures. Graphs. (Fe)

202-V. Titanium Problems and Opportunities, Spring 1955. Walter L. Finlay, C. I. Bradford and W. E. Gregg. *Light Metals,* v. 18, July 1955, p. 230-233.

Factors which are holding back greater increases in its use in aircraft, measures for minimizing or correcting them. Graphs. (Ti)

203-V. Historical Note on Sources and Uses of Beryllium. Robert F. Griffith. Paper from "The Metal Beryllium". American Society for Metals, p. 5-13.

Source of minerals, recovery, source countries, development of the industry, development of uses, outlook. Tables. 11 ref. (Be)

204-V. Beryllium-Rich Alloys. A. R. Kaufmann and P. Corzine. Paper from "The Metal Beryllium". American Society for Metals, p. 555-569.

Reviews possible approaches to the production of an alloy without the fatal brittleness of the pure metal, yet possessing low density, combined with high strength, high melting point and good moderating characteristics for neutrons. Diagrams, graphs, table. 26 ref. (Be)

205-V. (German.) **Bimetals.** Walter Rienäcker. *Zeitschrift für Metallkunde,* v. 46, no. 6, June 1955, p. 429-434.

Contact and thermo bimetals, alloys utilized, elongation behavior, properties of industrial thermo bimetals. Table, graphs, diagram. 5 ref. (SG-a)

206-V. (German.) **Alloys of Indium.** Siegfried Valentiner. *Zeitschrift für Metallkunde,* v. 46, no. 6, June 1955, p. 442-449.

Critical survey of metallurgical research on indium alloys, particularly from the point of view of the position of indium in the periodic system. Tables, phase diagrams. 86 ref. (In)

207-V. (Polish.) **Brasses With Low Copper Content.** Czeslaw Adamski. *Przeglad Odlewnictwa,* v. 4, no. 5, May 1954, p. 123-132; no. 6, June 1954, p. 157-162.

Effect of iron, manganese, silicon and other alloying elements on mechanical properties and corrosion resistance; applications. Micrographs, tables, photographs, graphs. 22 ref. (Cu)

208-V. Aluminum 5357. Non-Heat-Treatable Aluminum Alloy. *Alloy Digest,* no. Al-30, Aug. 1955.

Composition, physical constants, properties, machinability, workability, weldability, characteristics, forms available and applications. Tables. (Al)

209-V. Refractaloy 80. Precipitation-Hardened Super Heat-Resistant Alloy. *Alloy Digest,* no. Co-7, Aug. 1955.

Properties, composition, physical constants, heat treatment, machinability, workability, weldability, characteristics, forms available and applications. Tables. (SG-h, Co)

210-V. Mallory 100. Age-Hardenable Beryllium Copper Alloy. *Alloy Digest,* no. Cu-29, Aug. 1955.

Properties, physical constants, composition, machinability, workability, joining, pickling, heat treatment, corrosion resistance, characteristics, forms available and applications. Tables. (Cu, Be)

211-V. Nilvar. Low Expansion Alloy. *Alloy Digest,* no. Fe-8, Aug. 1955.

Properties, physical constants, composition, heat treatment, pickling, machinability, workability, weldability, corrosion resistance, characteristics and applications. Tables. (SG-s, Fe)

212-V. Permanickel. Age-Hardenable, High Strength, Corrosion-Resistant Nickel-Base Alloy. *Alloy Digest,* no. Ni-20, Aug. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, joining, pickling, corrosion resistance and applications. Tables. (Ni)

213-V. Jalloy 7. Manganese-Molybdenum Alloy Steel. *Alloy Digest,* no. SA-32, Aug. 1955.

Composition, properties, heat treatment, weldability, machinability and applications. Tables. (AY)

214-V. Rezistal 310 & 310S. Heat & Corrosion Resistant Steel. *Alloy Digest,* no. SS-33, Aug. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability, heat and corrosion resistance, specification equivalents, characteristics and applications. Tables. (SS)

215-V. Firth-VC. High Speed Abrasion Resistant Steel. *Alloy Digest,* no. TS-36, Aug. 1955.

Composition, properties, heat treatment, machinability, forms available and applications. (SG-j, TS)

216-V. Developments in Low-Alloy Steels for Welded Structures. C. L. M. Cottrell. *Alloy Metals Review,* v. 8, June 1955, p. 2-6.

Factors involved; shows, by means of austenite transformation data, influence of composition and other variables on the characteristics of some of these steels during welding. Table, graphs. 14 ref. (K general, AY-n)

217-V. Beyond the Metals. I-II. Van Caldwell. *Steel,* v. 137, Aug. 1, 1955, p. 72-74; Aug. 8, 1955, p. 73-76.

New super refractories and new uses for the older ones. Table, diagram, photographs. (SG-h)

218-V. (French.) **Alloys of the Platinum Metals. General Outline of Work in Recent Years.** Ernst Raub. *Revue de métallurgie,* v. 52, no. 6, June 1955, p. 429-439; disc., p. 439-440.

Problems relating to equilibrium diagrams of the palladium-manganese, palladium-chromium and platinum-manganese systems, and of the gold-platinum-palladium and palladium-copper, with gold or silver, alloys; combinations of the six platinum metals with metals of the third, up to the sixth, group of the periodic system; classified phases and changes of properties due to their appearance in the alloys with manganese, chromium and cobalt. Graphs, tables, diagrams. 28 ref. (EG-c)

219-V. (German.) **Development and Today's Status of the Weldable Structural Steel St. 52.** E. Folkhard. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 21, no. 6, June 1955, p. 183-198.

Composition of St. 52 steel in Germany, France, Belgium, Austria, England and the United States; mechanical properties; selection of welding electrodes; heat treatment. Tables, graphs, micrographs, photographs, diagrams. 14 ref. (Q general, K1, J general, AY)

222-V. (German.) **Properties and Weldability of Nonmagnetizable Steels.** Franz Rapatz and Alfred Schmidt. *Schweisstechnik,* v. 9, no. 5, May 1955, p. 49-55.

Composition, strength and electrical properties, and field of application of nonmagnetizable steels. Method and optimum conditions of welding. Tables, diagrams, photographs. (K9, ST)

223-V. (Book.) **The Metal Beryllium.** D. W. White, Jr. and J. E. Burke, editors. 703 p., 1955. American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. $8.00.

Primary concern of the book is the metal beryllium. but certain beryllium-rich compounds are also covered. Use of beryllium as an alloying element, as well as its use in atomic energy. Papers are individually abstracted. (Be)

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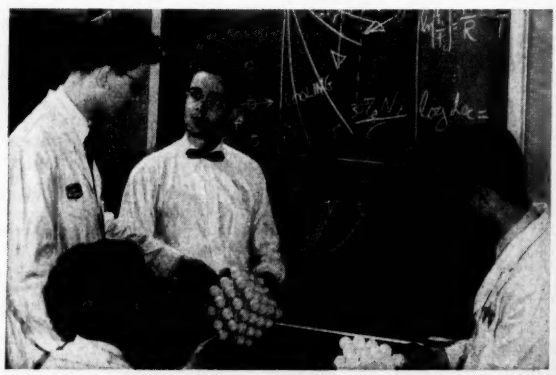
Engineering Staff Personnel, Post Office Box 2053
Dearborn, Michigan



THE SCIENTIFIC LABORATORY

Ford Motor Company Engineering Staff, Dearborn, Michigan

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The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

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METALLURGICAL ENGINEER: Research and development, for position as assistant chief metallurgist in foundry producing primarily cast iron and cast steel rolling mill rolls. Activities cover all phases of metallurgy in ferrous field. Reply fully in confidence, giving experience, qualifications. Salary in $400-600 range. Box 9-20.

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MECHANICAL METALLURGIST: Opening for young mechanical metallurgist with one to two years experience to work on interesting research and development programs. Permanent position with organization offering excellent opportunities for personal and professional growth. Liberal benefits, including generous tuition refunds for graduate study. Send resume to: T. E. DePinto, ARMOUR RESEARCH FOUNDATION of Illinois Institute of Technology, 10 West 35 St., Chicago 16, Ill.

METALLURGIST: Excellent opening in established Detroit laboratory engaged in ferrous and nonferrous metallurgical research. Applicant should be college graduate in metallurgy and must have completed obligation to military service; industrial experience an advantage but not a requisite. Please furnish full details of education and experience, along with expected salary and recent photograph. Box 9-25.

RESEARCH METALLURGISTS: Several attractive openings exist in a growing research and development laboratory of leading specialty steel manufacturer in Pittsburgh. Exceptional opportunities for professional development and advancement. Sound background in physical metallurgy, together with ability to organize research projects and write clear, concise reports required. Box 9-30.

METALLURGICAL ENGINEER: Young man with degree in metallurgy to assist chief metallurgist in laboratory analysis and solving production problems relating to use of tool-steels, ferrous and nonferrous metals, including brass and aluminum, which are subjected to cold working and annealing processes. Research on tool and die life. Lubrication. Box 9-35.

PHYSICAL METALLURGIST: Preferably with advanced degree for research and development in fields of nonferrous alloys and powder metallurgy. Salary commensurate with ability and experience. Send resume to: Donald G. Barkett, Goodyear Atomic Corp., Box 628, Portsmouth, Ohio.

METALLURGICAL or CHEMICAL ENGINEER: B.S. degree, recent graduate or graduate with one to three years experience, for laboratory work on chemical plant problems involving corrosion, heat treating and fabricating processes for metals. Send resume to: Donald G. Barkett, Goodyear Atomic Corp., Box 628, Portsmouth, Ohio.

RESEARCH ENGINEER or METALLURGIST: Sc.D. or M.S. in mineral or metallurgical engineering, to conduct research leading to better methods of mineral recovery. Process and flow sheet development for newly located ore bodies required, along with supervision of specific research problems on comminution, flotation, electrostatic and magnetic separation, smelting, leaching or other unit operations. Must have demonstrated ability for initiating and directing experimental work in fields of mineral dressing or extractive metallurgy. Two to three years' experience as research engineer desirable. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

RESEARCH ENGINEER: Ph.D. or Sc.D. in chemical engineering or extractive metallurgy for duties focused on technology of extremely pure metal compounds and their subsequent reduction to metals. Will have responsibility for bench-scale to pilot-scale work on unit operations such as leaching, chlorination, distillation, melting, high-temperature furnace work, solvent extraction and ion exchange. Ability in preliminary design desirable. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

SOLID-STATE PHYSICIST or METALLURGIST: Ph.D. in solid-state physics or metallurgy to conduct fundamental research in field of magnetic materials. Work should lead to design of new alloys for improved permanent magnets. Substantial dissertation research experience on magnetic properties of materials will be adequate background. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

PHYSICAL CHEMIST: Ph.D. in physical chemistry or metallurgy for investigation of physical chemistry of reactions occurring during melting and refining of metals in connection with design of new alloys based principally on heavy, nonferrous metals and newer metals, such as titanium. Research experience or dissertation in molten metal equilibria preferred. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

PHYSICAL METALLURGIST: M.S. or Ph.D. or equivalent in physical metallurgy for investigation of kinetics of solid-state reactions leading to design of new alloys for high-temperature applications as well as alloys based on reactive metals such as titanium. Must be capable of originating and directing research programs in alloy design. Research experience in field of alloy design desirable. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

RESEARCH MECHANICAL ENGINEER or METALLURGIST: Ph.D. in mechanical engineering or metallurgy for fundamental investigations on deformation of metals based on modern theory and mathematical analysis. No research experience required. Combination of physical metallurgy and mechanical engineering preferred. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

PHYSICAL CHEMIST: Ph.D. in physical chemistry or metallurgy for investigation of reactions of solid metal with gas at elevated temperatures. Emphasis on the oxidation of metals. Apply existing oxidation theory in attempt to improve oxidation resistance of present high-temperature alloys and to develop oxidation resistant alloys based on the newer metals such as titanium. Research ex-

perience or dissertation on solid metal gas reactions preferred. Send resume of education, experience and salary expectations to: M. L. Baas, Metals Research Laboratories of the Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N. Y.

METALLURGICAL ENGINEERS: Expanding applied research and development program is creating a wide variety of excellent career opportunities for both experienced and inexperienced metallurgical engineering graduates. For prompt, confidential consideration please write to: Personnel Manager, Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

METALLURGIST: Excellent opportunity for young man seeking permanent position in medium-sized community, West-Central Illinois. To carry out experimental, control and some research activities of wide variety of metallurgical processes in industrial operation. Recent graduate preferred. In reply give details of education, experience, age, references and salary requirement. Box 9-45.

METALLURGICAL ENGINEER: Excellent opportunity in research department of major automotive manufacturer. Require three to five years experience in heat treatment of steel and at least a B.S. degree in metallurgy. Box 9-50.

East

METALLURGISTS: Graduates, with practical experience involving heat treatment of ferrous and nonferrous metals. Several jobs including production management, metallurgical and engineering development, customer contact, etc., leading to top management in one of nation's leading commercial heat treating concerns. To apply sciences of metallurgy and management in highly diversified field, demanding utmost in ability, resourcefulness and skill. A long-range, challenging opportunity with excellent future for men of outstanding quality. Compensation according to proved worth. Reply with photo (nonreturnable) and full details to: Metlab Co., 1000 East Mermaid Lane, Philadelphia 18, Pa., or drop in and see Horace Knerr, president, at Booth 1047, during the National Metal Exposition at Convention Halls, Oct. 17-21.

METALLURGICAL ENGINEER: For nonferrous plant in southeast Pennsylvania. Experienced in fabrication of nonferrous alloys and thorough knowledge of ingot casting, hot rolling and annealing. For metallurgical control work and development of process procedures. Excellent opportunity. Write details of education, experience, salary requirements, etc. Box 9-55.

MATERIALS ENGINEER: Graduate metallurgist with practical and industrial experience in fabrication of nonferrous alloys with growth company in southeast Pennsylvania. To work between plant and sales for customer contact work. Write details of education, experience, salary requirements, etc. Box 9-60.

ASSISTANT TO CHIEF METALLURGIST: Prefer young married man for permanent position with considerable opportunity. Specialists in powder metallurgy fabrication field. Experience helpful but not positively essential. Box 9-65.

METALLURGICAL ENGINEER: B.S. in metallurgy. Age 25-36, with minimum of three years experience in metallurgical laboratory. Education and experience should include ferrous and nonferrous metallurgy with emphasis on ferrous. Job entails installing metallurgical section in established research laboratory for study of steel and nonferrous materials, welding and development of new alloys. Location in central New Jersey. State education, experience and salary expected. Box 9-70.

SALES ENGINEER: Young, for New England territory. Technical training desirable, experience not essential. Box 9-75.

CONSULTANT METALLURGIST: $8360 per year. Candidates should have broad experience in welding metallurgy and laboratory test procedures. WELDING ENGINEER: $5940 per year. Candidates should have metallurgical background in development of welding procedures. Send Standard Form 57, obtainable in Post Offices or Government installations, to: Industrial Relations Officer, U. S. Naval Engineering Experiment Station, Annapolis, Md.

METALLURGIST: Grades GS-9 and GS-11, salaries $5440 and $6390. Degree and at least 20 hours metallurgical subjects required, plus 1½ years professional experience for grade GS-9 and 2½ years for grade GS-11. GS-9 duties include responsibility for physical examinations of metal, adapting or modifying accepted methods of examination or devising new approaches to analyses. Conduct planned

programs of metal examination to determine cause of failures in ordnance materiel. GS-11 duties on metallurgical and radiographic examination of failures in ordnance materiel. Analyze, interpret and correlate data, prepare reports. Send Standard Form 57 to: H. F. Grossman, Executive Secretary, Board U. S. Civil Service Examiners, Ordnance Corps, Aberdeen Proving Ground, Md.

South

RESEARCH METALLURGIST: Excellent opportunity for research and development work in advanced fields of metallurgy. Very attractive working conditions. Applicants should be capable of leading projects and writing clear, concise, reports. Write: Southern Research Institute, Birmingham 5, Ala.

Southwest

METALLURGIST: For major oil refinery. To work principally in steel metallurgy and associated corrosion problems. Openings lead to supervision of metallurgical investigations. Applicant must have thorough knowledge of metallurgical principles and good background in physical chemistry, metallography, corrosion and physical metallurgy. Box 9-80.

Canada

PHYSICAL METALLURGIST: To undertake both fundamental and applied research on nonferrous metals, primarily lead and zinc and their alloys. Salary dependent on qualifications and experience. Location in southern British Columbia. Apply to the manager, Personnel Division, Consolidated Mining and Smelting Co. of Canada Ltd., Trail, B.C., Canada.

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NONFERROUS METALLURGIST: The United Nations desires to send to Pakistan for one year a nonferrous metallurgist capable of advising small firms on all phases of brass foundry work, plus problems met by small rolling mills and manufacturers of hollow ware. Address Donald B. Kennedy, Code SRS/55, Technical Assistance Services, United Nations, N. Y.

POSITIONS WANTED

CHIEF METALLURGIST, DIRECTOR OF LABORATORIES: Graduate metallurgical engineer, professional license, age 34, desires position utilizing managerial experience. Laboratory control, plating, welding, corrosion, machinability, heat treatment, including induction and flame hardening. Ferrous and nonferrous. Specifications and inspection systems. East Coast preferred. Minimum salary $10,000. Box 9-85.

METALLURGICAL ENGINEER: B.S. degree, age 24, single, veteran. Three years experience in research and development laboratories including forging, welding, extrusion, deep drawing and heat treatment of ferrous and titanium alloys. Desires responsible position in production, process development or technical sales. Available November. Box 9-95.

METALLURGICAL ENGINEER: B.S. degree, age 25, single, veteran. Experience includes one year research and development in nonferrous powder metallurgy, two years in government research laboratories. Work included evaluation of materials for cold extruded products, melting of titanium, heat treatment of alloy steels. Desires responsible position in development, production or technical sales. Available November. Box 9-100.

METALLURGIST: M.S. degree, 16 years research and control experience in light and electron metallography, powder metallurgy, corrosion in steels, copper, tungsten, titanium. Desires responsible position, preferably in research, within commuting distance of Bridgeport, Conn., area. Box 9-105.

METALLURGIST: B.S. degree, age 32, married. Six years diversified metallurgical experience including three years with large steel producer. Familiar with all phases of sheet steel production. Experienced in ferrous metallography. Three years research, including precipitation and recrystallization studies in low carbon steel, evaluation of physical properties of boron steels, high-speed elevated-temperature testing of metals and alloys. De-

sires position in industry utilizing technical background. Box 9-110.

METALLURGIST: B.S., Ch.E. degrees, age 32, veteran. Five years in nonferrous metallurgy as production problem metallurgist and alloy development metallurgist. Experience includes melting, casting, processing of metals, heat treatment, metallurgical testing, metallography and considerable technical report writing. Desires position in metallurgy utilizing a chemical engineering background and administrative ability. Box 9-115.

METALLURGICAL ENGINEER: P.Eng., M.E.I.C., M.C.I.M.M., Canadian born, married, age 37, graduate McGill University. Course in management administration. Twelve years diversified experience in ferrous metallurgy. Development and supervision of chemical and metallurgical laboratories, inspection, specification and technical service divisions in steel finishing. Presently employed but seeks more responsible position. Box 9-120.

METALLURGICAL ENGINEER: B.S. degree, age 37. Twelve years experience as material engineer in automotive industry, including material specifying, specifications writing, statistical analysis, stress analysis by brittle lacquer method, nondestructive testing, trouble shooting, three years in battery plant. Location not important. Box 9-125.

METALLURGIST: Ph.D. Two years experience in nonferrous foundry, two years teaching, three years in reactor metallurgy. Desires supplementary part-time position in teaching, consulting or research in New York-Northern New Jersey area. Box 9-140.

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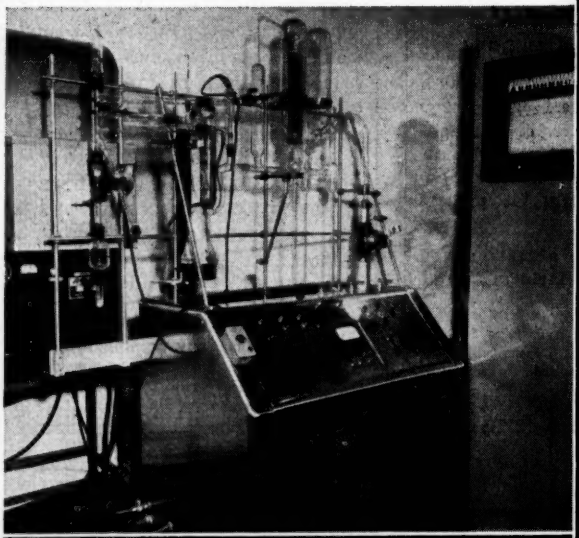

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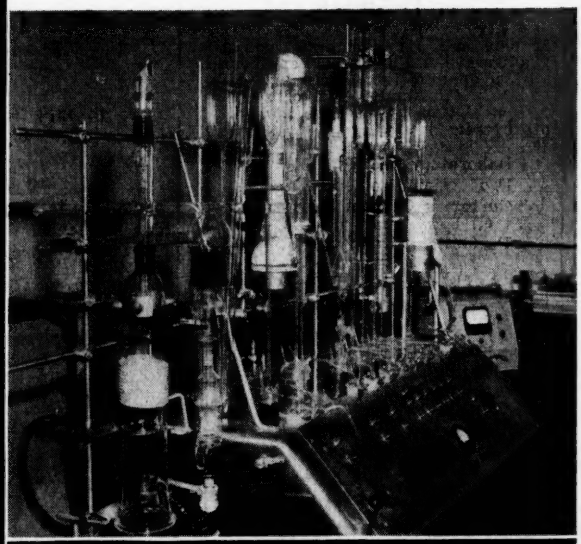

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Invitation to Entrants . . . .

10th Metallographic Exhibit

Entries are invited in the 10th A.S.M. Metallographic Exhibit, to be held at the National Metal Exposition in Philadelphia the week of Oct. 17 through 21, 1955. Entries will be displayed to good advantage and awards will be given for the best micrographs as decided by a committee of judges.

Awards and Other Information

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of $100, will also be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's National headquarters in Cleveland.

All photographs may be retained by the Society for one year and placed in a traveling exhibit to the various Chapters. They will be returned to the owners in May 1956 if so desired.

Classification of Micros

BLACK AND WHITE PRINTS

1. Carbon and alloy steels
2. Stainless steels and heat resisting alloys
3. Iron, cast and wrought
4. Aluminum, magnesium, beryllium, titanium and their alloys
5. Copper, nickel, zinc, lead and their alloys
6. Metals and alloys not otherwise classified
7. Series showing transitions or changes during processing
8. Welds and other joining methods
9. Surface phenomena
10. Results by unconventional techniques (other than electron micrographs)
11. Slags, inclusions, refractories, cermets
12. Color micros (prints; no transparencies accepted)

Rules for Entrants

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard; maximum dimensions should be limited to 15 by 22 in. Heavy, solid frames are not permissible because of difficulties in mounting the exhibit. Entries should carry a label on the face of the mount giving:

Classification of entry
Material, etchant, magnification
Any special information as desired

The name, company affiliation and postal address of the exhibitor should be placed on the BACK of the mount.

Transparencies will NOT be accepted.

Entrants living outside the U.S.A. should send their micrographs by first-class letter mail endorsed "Photo for Exhibition—May be opened for customs inspection." To be acceptable as first-class mail the package should measure no more than 35 x 45 cm. (14 x 18 in.)

Exhibits must be delivered before Oct. 10, 1955, either by prepaid express, registered parcel post or first-class letter mail, addressed to:

A.S.M. Metallographic Exhibit
National Metal Exposition
Convention Hall
Philadelphia 4, Pa.

37th National Metal Congress and Exposition

Philadelphia 4, Pa. — October 17 to 21, 1955

ELECTRO-MAGNETIC STIRRING ACTION

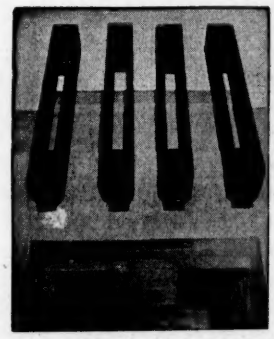
Holden Furnaces provide Electro-Magnetic Stirring Action in accordance with the well-known "Motor Law":

> "When a conductor carries the current into the magnetic field there is a force acting on the conductor at right angles to the field and to the current."

Holden Furnaces provide more than just electro-magnetic stirring action. They provide uniformity of plus or minus 5° F., regardless of depth.

SPLIT ELECTRODES:

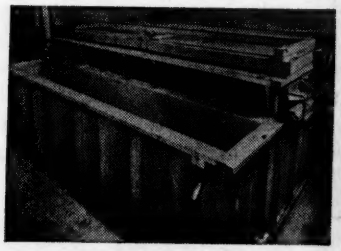
Split Electrode Assembly, as featured on the Type 701-4, is a part of U. S. Patent No. 2,701,269, which provides not only a forced action downward, but also force circulation unparalleled in any electro-magnetic field, with 100% clear working space.



Type 701-4 Submerged Electrode Unit with ceramic pot for neutral hardening and annealing 1000-2300°F.

ELECTRODE REPLACEMENT: (Guarantee)

In normal operation, you will find that our quotation for replacement electrodes is 20% LESS than electrode designs you are now using. If you use the complete design of Holden electrodes and cables, you will also have an additional saving, inasmuch as your work production for the individual furnace will increase approximately 15%.



Aluminum Heat Treating

Descaling—Descaling 18,000 lbs. per hr.—1800 KVA

THE A. F. HOLDEN COMPANY

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